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FINAL REPORT

EVALUATION OF CONSERVATION SYSTEMS: COOPERATOR ATTITUDE CHANGE

PILOT WATERSHED STUDY, SWEEP

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EXECUTIVE SUMMARY

EVALUATION OF CONSERVATION SYSTEMS: COOPERATOR ATTITUDE CHANGE, PILOT WATERSHED STUDY, SWEEP

1.0 Introduction

The mandate of the Soil and Water Environmental Enhancement Program (SWEEP) was to reduce phosphorus loadings to the Lake Erie basin and to maintain or improve agricultural productivity by reducing or correcting soil erosion and degradation. Conservation cropping and tillage systems were identified as the best means to achieve these goals over a wide geographic region such as the Lake Erie watershed. The Pilot Watershed Study (PWS) was developed as a means of evaluating the impact on conservation systems on soil erosion and degradation, water quality and crop production when implemented.

Maximizing farm operator participation in soil erosion and sediment control programs is essential to achieving improvements in water quality and sustainable levels of crop production in areas where pollution occurs from agricultural runoff. High participation rates in localized areas were particularly crucial in the Pilot Watershed Study (PWS) where implementation of conservation practices by cooperators in the test sub-watershed was key to discovering whether or not long-term improvements in soil, water and crop production parameters would occur, relative to those in the control sub-watershed.

At the same time that soil and water quality-related benefits were important to demonstrate in the Pilot Watershed Study, it was also necessary to evaluate factors that affected the adoption of soil and water conservation practices and influenced farmer attitudes towards these practices. In the short-term, understanding why a farmer chose to adopt, adapt or reject a particular practice provided the basis for adjusting program delivery on a day-to-day basis. In the post-PWS era, such findings can contribute to the effective design, targeting and implementation of other soil and water conservation initiatives.

2.0 Objectives

The longitudinal nature of the PWS provided the opportunity to explore a number of research objectives relating to conservation attitude change over time. These included:

1. to obtain cooperator perceptions of on-farm soil erosion and local water quality change over the life span of the project;
2. to determine the changes which occurred in cooperator attitude toward the merits of conservation practices and their own willingness to accept risk related to implementing conservation practices;

3. to track the main reasons cooperators decided to continue to work with or discontinue the use of specific conservation practices over time and across types of enterprise;

4. to determine cooperator perceptions of effectiveness of individual conservation practices in controlling erosion, of practice impact on crop yields and farm profitability and the extent to which the practice is accepted in the community;

5. to determine the degree to which the cooperators have "owned" the soil erosion problem and its resolution.

3.0 Methodology

Tracking attitudinal change took several different forms throughout the life span of the PWS. The majority of data collection efforts focussed on personal interviews of the cooperators. These surveys served to collect baseline data (June 1988), midpoint, equipment use, and end-of-project data (January 1992). Watershed technicians also collected additional ongoing, qualitative attitude change data in their regular contacts with the cooperators.

Data were analyzed at a number of different levels, including: pairs of test and control sub-watersheds; among all three test sub-watersheds, and; grouped test versus grouped control sub-watersheds.

Cross-sectional (point-in-time) and longitudinal (ongoing through time) analyses were conducted for relevant variables in assessing attitude change over time. Where longitudinal analyses were conducted, only those cooperators responding to both the baseline survey and the concluding survey were included in the data set to ensure that the findings reflected accurately and consistently, individual attitude change over the full course of the project.

4.0 Conclusions

The conclusions are grouped as follows: cooperator perception of the problem and the general merits of soil conservation; factors affecting adoption; perception of practice effectiveness; factors inherent to the PWS itself, and; suggestions for future programming.

Cooperator Perception of the Soil Erosion Problem/Merits of Soil Conservation

1. Recognition of soil degradation as a problem on cooperator farms appeared to be an important prerequisite to obtaining consistent farmer interest and response;

2. Implementation of erosion control measures resulted in test cooperators perceiving slightly less erosion on their farms in 1992 relative to 1988. Conversely, control cooperators as a group perceived slightly more erosion happening on their farms over the

same time period. Control cooperators probably became sensitized to the erosion problem as a result of the PWS, but did not receive the encouragement to implement measures within the watershed boundaries to alleviate the problem.

3. There is evidence that cooperators in general, affirmed the overall concept of soil and water conservation. In all sub-watersheds, cooperators agreed that "conserving soil and water is a good investment for their area".

   In all three test sub-watersheds in 1992, there was a trend toward disagreement with the statement, "costs to the farmer of soil conservation are greater than the on-farm benefits", relative to how they responded in 1988. This suggested that positive experiences shaped their thinking over the four years, to the point where net returns/farm profitability for virtually all conservation practices were viewed positively.

Factors Affecting Adoption

1. Cooperators' reasoning for choice of conservation practice varied by watershed and over time. In Kettle, where soil erosion was most obvious and where the expressed need for erosion control was the greatest, there remained a continuing desire to do what is right for the land resource (biophysical reasons). Having installed structures, Kettle cooperators demonstrated a growing appreciation for the positive economic benefits of the no-till cropping system in particular, in order to complement the work of the structures. Essex cooperators shifted away from biophysical reasoning to a focus on economic and farm management concerns over the life of the PWS. In Pittock, there appeared to be a growing appreciation of benefits to the land resource, but less consideration of economics as a motivating force.

2. Motivation for practice implementation initially required experimentation with practices farmers were most familiar with and which were most easily incorporated into farming systems. In both Kettle and Essex, initial discussions and experimentation centered around modifications to the moldboard plow. Practice introduction time was reduced by building on practices farmers were familiar with, and by being ready to suggest or respond to requests for technical guidance on the more complicated conservation practices as they arose.

   Initial emphasis on structures on long slopes in Kettle seemed an appropriate starting point for some conservation discussions. After the structures were installed, several cooperators noted sediment build-ups in the ponded areas behind the berms. This prompted serious consideration of no-till practices to minimize soil movement off the fields.

3. The time required for practice adoption appears to remain a highly variable and individually-oriented factor. Farm enterprises with livestock manures needing incorporation, or with certain specialty cash crops (e.g. white/coloured beans) were most hesitant to consider conservation cropping systems that included no-till. Very large,

diversified farm enterprises with tight crop planting and harvesting schedules did not want to "bother" with scheduling the use of PWS equipment and time to keep field records.

On the other hand, cooperators who enjoyed modifying and fine-tuning management systems tended to be more patient in working with the more complicated alternative tillage and cropping practices. Timing of technician input was important, particularly where weather was a factor and where the cooperator was open to integrating alternative tillage practices with structural control measures. Access to the PWS equipment was a crucial component in encouraging practice adoption. Farm tours in Ontario and beyond served to stimulate and reinforce adoption behaviour.

In general, cooperators agreed that five to ten years is a realistic time frame to achieve a satisfactory comfort level with integration of conservation planter equipment into their management systems. Cooperators generally considered three years adequate for the conservation drill.

Perception of Practice Effectiveness

1. Test cooperators had a high regard for the effectiveness of the conservation practices they have implemented for limiting soil loss. For others who perceive they have a problem, this can serve as a strong motivating force.

2. Test cooperators were generally neutral or slightly positive about practice effects on crop yields. They were almost always more positive with respect to "effects on profitability". This bodes well for future adoption as cooperators appeared to be acknowledging the net financial benefits of implementation of even the less familiar practices.

3. Test cooperators in Essex and Kettle had a substantially more positive view of the community acceptance of no-till practices in 1992 relative to 1991. Peer support can contribute to higher adoption rates.

Factors Inherent to the PWS

1. Several cooperators, particularly in Pittock, raised the issue of their own lack of understanding of project design and goals from the outset. It is possible that cooperators who missed one or more of the early orientation meetings were not personally updated on meeting content and therefore developed certain misconceptions about the project (eg. water quality monitoring results to be potentially used against them).

2. The PWS did not provide for designation of a cooperator spokesperson or a small committee to whom project participants could take their concerns and suggestions. This could have served a purpose in providing a "safe place" for cooperators to negotiate disputes and provide a sense of continuity when changes in technical staff occurred.

3. Some interest was expressed in both Essex and Pittock in lowering herbicide use and promoting "ecological" agriculture. Specifically, band spraying combined with inter-row cultivation was mentioned as a technique that the PWS could not provide equipment for, or had few technical or financial resources to use in support of these ideas.

4. Few resources were allocated to dissemination of PWS experience beyond the boundaries of the watersheds. Wider community support for, and understanding of conservation initiatives may have been engendered by such promotion. However, some local organizations gave some profile (conservation/production awards) to selected conservation farmers whose experience was built through the PWS.

Cooperator Perspectives on Post-PWS Conservation Intentions and Future Programming

1. There appeared to be interest in maintaining or increasing acreage of crops under selected conservation practices in each of the watersheds. The focus is expected to be on no-till in Kettle and Essex, along with some increase in cropping systems practices (e.g. winter cover crop grown for crop or tilled in spring). Fewer cooperators in the Pittock watershed were choosing to expand no-till practices; rather, there appeared to be a reliance on cropping systems practices.

2. The most frequently cited kinds of support required to enable continuation of cooperator conservation goals post-PWS included:
   - money from better crop prices and through financial assistance programs;
   - availability of equipment at low cost, as it is too expensive to buy;
   - continued technical support.

3. In future programming, cooperators suggested the following approaches:
   - a low key, non-threatening approach where the farmers help set the agenda, simiiar to the PWS approach;
   - take prospective cooperators on tours to see first hand how other people are working with the specific techniques, and thus provide motivation;
   - keep cooperators up-to-date with project findings along the way;
   - ensure technical support is based in the local community;
   - where possible, involve cooperators in environmental monitoring or other field testing exercises.

5.0 Recommendations

Recommendations applicable to other conservation programming initiatives where accelerated adoption rates are sought, are noted below:

1. determine from potential cooperators, whether they perceive a soil erosion problem, and whether they are willing to try to correct it. Also, ensure that they are presented with

current information about the soil conserving attributes and economic benefits of the conservation measures they are being asked to consider to alleviate the problem;

2. whenever cooperators are unable to attend project information sessions particularly at project start-up, contact each cooperator to ensure they get the same information as everyone else. This will minimize the possibilities of misunderstandings arising related to project intentions and objectives;

3. wherever possible, include peer support mechanisms for promoting newer practices such as no-till. These may include visits to other conservation farms of similar enterprise types where exposure to proven techniques can occur, or participation in technical workshops, seminars or demonstration sites;

4. ensure that adequate technical support is available locally, and that access to equipment at critical cropping phases does not pose a constraint to experimentation with alternative practices;

5. ensure that cooperators have a "safe place" where they feel comfortable taking their project-specific concerns. This may require setting up a cooperator committee as a sounding board where potential disputes can be resolved and where continuity can be maintained should change in technical staff occur;

6. in future programming, use a low-key, non-threatening approach to project design and implementation where farmers help set the agenda. The farm management system and enterprise-specific conservation needs and constraints must be addressed with each cooperator.

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The following lists the participating agencies and responsible individuals for components of this study:

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Environment Canada	Mr. Len Camp	Streamflow Monitoring at Watershed Mouths
Ontario Ministry of the Environment	Mr. Jim Eddie	Watershed Scale Water Quality and Meteorological Monitoring
Beak Consultants Limited	Mr. M. Holloran	Project Management
	Mr. R. Walker	Environmental Program Management
Ecologistics Limited	Mr. D. Cressman	Study Process Management
	Ms. J. Sadler Richards	Agronomic Program Management
	Mr. M. Fortin	

1.0 INTRODUCTION

1.1 Background

The Soil and Water Environmental Enhancement Program (SWEEP) was initiated in 1986 with an overall mandate to:

- reduce Ontario's Non-Point Source (NPS) loadings of phosphorus to Lake Erie from agricultural sources by 200 tonnes; and
- maintain or improve the productivity of the primary agricultural sector in Southwestern Ontario by reducing or correcting soil erosion and degradation.

The Pilot Watershed Study (PWS) is a major SWEEP sub-program aimed at evaluating and demonstrating the benefits of established conservation farming systems at the watershed and smaller scales. Figure 1.1 shows the overall SWEEP organizational structure and the PWS sub-program relationship to the Program. Cooperating agencies; Environment Canada (EC), Agriculture Canada (AC), and the Ontario Ministry of the Environment (MOE) are identified. Beak Consultants Limited (BEAK) is the prime contractor responsible to AC and MOE. Ecologistics Limited (ECOLOGISTICS) is a sub-contractor to BEAK responsible for site selection and the agronomic program of the PWS.

The PWS started in 1987 with detailed study design, staffing, training, cooperator enlistment, and watershed selection. Farm plans were initiated in August, 1988 and environmental monitoring began later the same year.

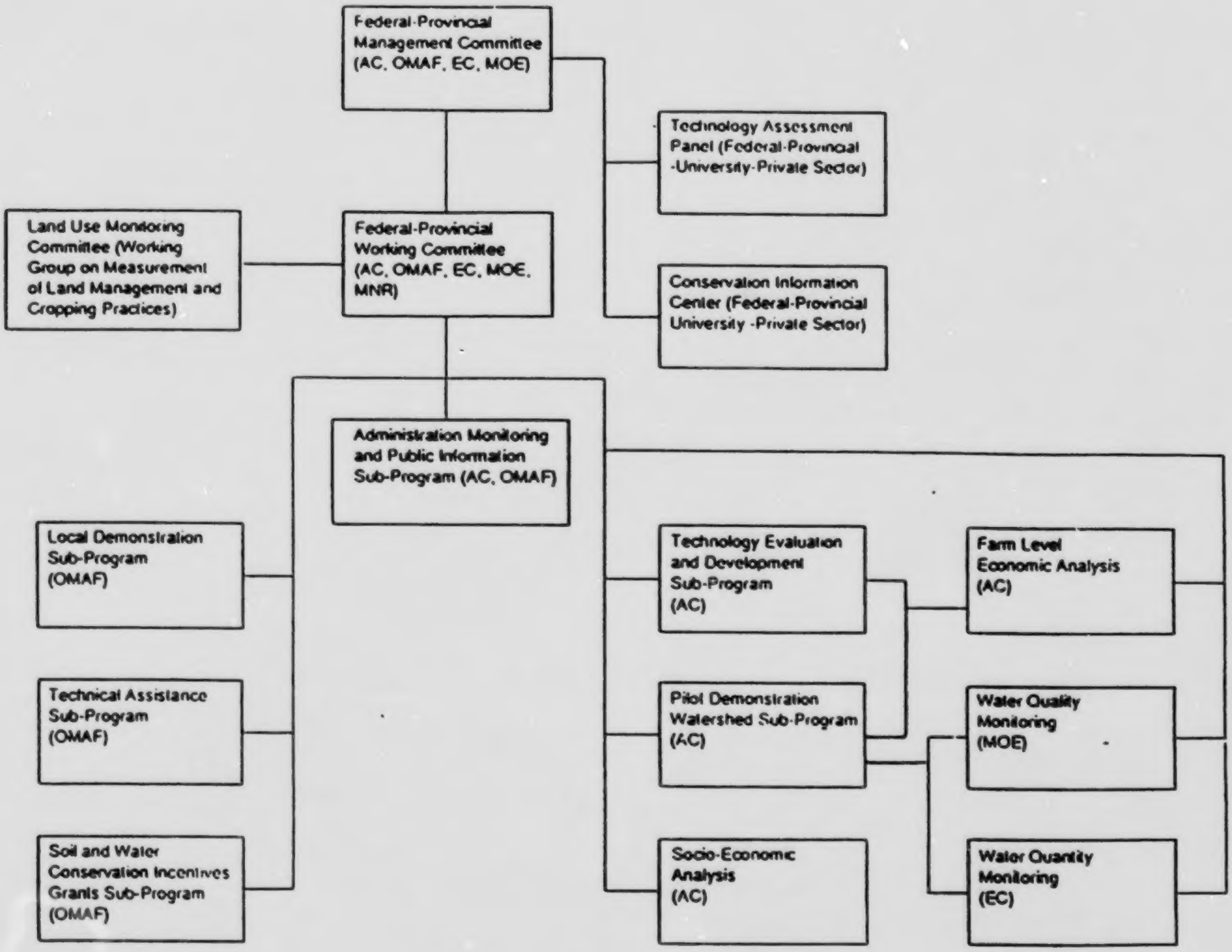
Monitoring and evaluation were conducted from late 1988 until mid 1992.

Figure 1.2 shows the location of PWS subject areas within the Lake Erie Watershed. These are situated within different yet common agricultural and physical settings.

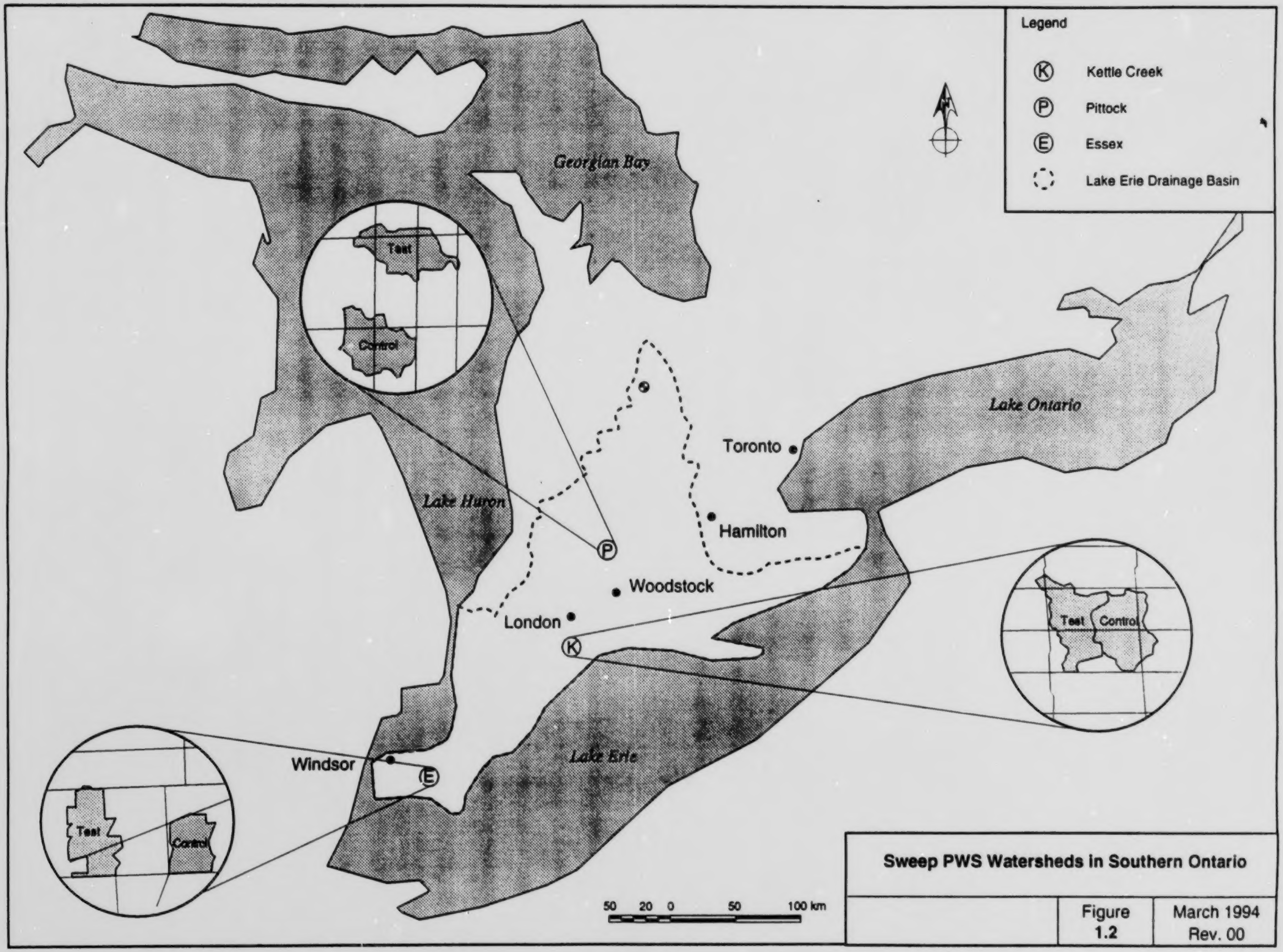
The PWS has the following key features:

- four year implementation and monitoring period;

Figure 1.1: SWEEP Organizational Structure


Federal-Provincial Management Committee (AC, OMAF, EC, MOE)
Technology Assessment Panel (Federal-Provincial -University-Private Sector)
Land Use Monitoring Committee (Working Group on Measurement of Land Management and Cropping Practices)
Federal-Provincial Working Committee (AC, OMAF, EC, MOE, MNR)
Conservation Information Center (Federal-Provincial University -Private Sector)
Administration Monitoring and Public Information Sub-Program (AC, OMAF)
Local Demonstration Sub-Program (OMAF)
Technology Evaluation and Development Sub-Program (AC)
Farm Level Economic Analysis (AC)
Technical Assistance Sub-Program (OMAF)
Pilot Demonstration Watershed Sub-Program (AC)
Water Quality Monitoring (MOE)
Soil and Water Conservation Incentives Grants Sub-Program (OMAF)
Socio-Economic Analysis (AC)
Water Quantity Monitoring (EC)

Abbreviations
AC Agriculture Canada
EC Environment Canada
MNR Ontario Ministry of Natural Resources
MOE Ontario Ministry of the Environment
OMAF Ontario Ministry of Agriculture and Food



Sweep PWS Watersheds in Southern Ontario

Figure 1.2	March 1994 Rev. 00

- **test** (conservation oriented systems) and **control** (conventional systems) paired watershed design;
- pro-active agronomic management involving annual farm planning, cooperator compensation program, ongoing producer extension program, availability of conservation-type farm implements, detailed cooperator record keeping, crop scouting and productivity analysis, and farm level socio-economic evaluation;
- intensive and continuous environmental monitoring at plot, field and watershed scales;
- detailed soil survey and soil quality monitoring;
- extensive environmental monitoring program including meteorology, hydrology and water quality; and
- detailed evaluation involving the application of two modelling systems for farm planning and systems evaluation.

The paired watershed study design is a unique approach which relies upon direct comparisons between the **test** and **control** areas as the primary method of environmental and agronomic evaluation. The effects of scale, at whole watershed, farm, field and plot scales are also a fundamental aspect of the study design which systematically addresses the relationship between producer attitudes and adoption as well as between measurable benefits, complexity, and scale.

1.2 Objectives of the Pilot Watershed Study

Objective Regarding Study/Approach

To achieve a high level of adoption of the most appropriate soil and water conservation practices among farm operators utilizing lands in the **test** sub-watersheds.

Strategy

1. Develop and employ a watershed selection process which:

    a) optimizes the probability of farm operator adoption of desirable practices, and
    b) can be applied effectively to critical areas in the larger Lake Erie basin.

2. Develop and utilize improved soil and water conservation planning tools for application at the farm and watershed levels.

3. Develop and utilize contract arrangements with cooperating farm operators which specify and compensate for participation in the project without "buying" their participation.

Objective Regarding Effectiveness

To determine the nature and degree of changes in relevant soil and water quality parameters and crop yields as influenced by "basin-wide" soil and water conservation practices.

Strategy

1. Select pairs of watersheds which are as similar as possible in respect to physiography, hydrology, and farming systems.

2. Develop and apply mechanisms to encourage adoption of soil and water conservation practices throughout the life of the project in the **test** sub-watersheds and to discourage adoption in the **control** sub-watersheds.

3. Establish soil, water and crop yield baseline conditions and monitor changes in relevant parameters throughout the life of the sub-program.

4. Correlate changes in soil, water and crop yield parameters to soil and water conservation practices and systems.

5. Evaluate improvements to planning tools (models) achieved during the sub-program.

6. Evaluate factors that affect the adoption of soil and water conservation practices and that influence farmer attitudes towards both the practices and the goals of the sub-program.

Objective Regarding Information Dissemination

To prepare information about sub-program activities and results and to transmit this to participating farmers and other related SWEEP sub-programs.

Strategy

1. Collect and transmit, as required, to the SWEEP sub-program contractor responsible for the farm-level and basin-wide economic analysis.

2. Prepare information on activities and results for the communications sub-program contractor.

3. Prepare periodic reports to cooperating farmers on activities and results in written and meeting formats.

1.3 Report Structure

The overall PWS reporting has been sub-divided into the following categories:

- Report #1 - Study Area Selection, Description and Climate;
- Report #2 - Implementation of Conservation Systems;
- Report #3 - Evaluation of Conservation Systems, Social Factors;
- Report #4 - Evaluation of Conservation Systems, Soils and Crops;
- Report #5 - Evaluation of Conservation Systems, Hydrology;
- Report #6 - Evaluation of Conservation Systems, Water Quality;
- Report #7 - Modelling; and
- Report #8 - Executive Summary.

Each report is a stand alone document including a summary, descriptions of objectives, methodologies, observations, discussion, and summarized listings of relevant data where applicable. The Executive Summary is a compilation of summaries from all of the technical reports.

This report documents the modelling activities undertaken as part of the PWS.

1.4 Objectives of the Attitude Change Component

The longitudinal nature of the PWS has provided the opportunity to explore and address a number of research questions/objectives relating to conservation attitude change over time, including:

1. What changes to on-farm soil erosion and to local water quality do cooperators perceive over the life span of the project?

2. What changes have occurred in cooperator attitude toward the merits of conservation practices and their own willingness to accept risk related to implementing conservation practices?

3. What are the main reasons cooperators have decided to continue to work with or discontinue the use of specific conservation practices?
   - How much time is required to decide about the use of conservation practices?
   - Are there farm firm or farmer characteristics associated with readiness to adopt conservation practices?

4. How effective do they perceive individual conservation practices to be in controlling erosion? What are their perceptions of practice impact on crop yields, farm profitability and the extent to which the practice is accepted in the community?

5. What can be learned about the merits of a community-based approach to conservation decision-making and implementation?
   - To what extent has the PWS influenced the cooperators relative to other concurrent soil and water conservation programs?
   - Was "sense of group" achieved in planning and review meetings?
   - How supportive of soil and water conservation efforts was the community?

6. To what degree have the cooperators "owned" the soil erosion problem and its resolution?
   - Does information about soil and water conservation affect their farm management decision-making?
   - Is the practice perceived to be fitting into their farm management system?

- What are their future conservation practice intentions following termination of the PWS?

7. How do the cooperators rate their overall experience with the PWS? What other evaluative comments or suggestions do they have in light of their participation in the PWS?

By addressing these questions, it is possible to analyze the PWS's contribution toward attitude change within the project boundaries, and to evaluate its potential contribution towards conservation practice and technology transfer in the broader Ontario context.

2.0 COOPERATOR ATTITUDE CHANGE

Maximizing farm operator participation in soil erosion and sediment control programs is essential to achieving improvements in water quality and sustainable levels of crop production in areas where pollution occurs from agricultural runoff. High participation rates in localized areas were particularly crucial in the Pilot Watershed Study (PWS) where implementation of conservation practices by cooperators in the test basin was ultimately key to long-term improvements in soil, water and crop production parameters, relative to those in the control basin.

At the same time that soil and water quality-related benefits were important to demonstrate in the Pilot Watershed Study, it was also necessary to evaluate factors that affect the adoption of soil and water conservation practices and that influenced farmer attitudes towards these practices. In the short-term, understanding why a farmer chose to adopt, adapt or reject a particular practice provided the basis for adjusting program delivery on a day-to-day basis. In the post PWS era, such findings can contribute to the effective design, targeting and implementation of other soil and water conservation initiatives.

It is acknowledged that the implementation phase of the PWS was a relatively short time frame within which to expect decisive change in cooperator attitudes towards conservation practices. Many of the cooperators had no or little previous experience in working with conservation tillage or in applying conservation systems to their entire farm. A proactive approach was thus used to engage cooperators in discussion about the conservation practice options suitable to their farm operation. This approach is discussed in detail in the PWS report - Implementation of Conservation Systems.

2.1 Supporting Literature

There is widespread recognition in the scientific literature that a complex interrelationship of socioeconomic and other factors governs conservation thinking and behaviour at the farm level. The social and economic factors identified by numerous authors were grouped by Ecologistics Limited (1990) as follows:

Social Factors

a) Personal
  - demographics (age, education, years of farming experience)
  - risk orientation
  - perception of soil erosion as a problem
  - plans to maintain farm in family hands
  - past experience with conservation practices
  - contact with extension personnel
  - management skills/ability

b) Community
  - existence/accessibility/dissemination of technical information in the farm community
  - cultural/community attitudes and norms
  - non-farm public expectations
  - peer/reference groups

Economic Factors

a) Farm-Level
  - tenure
  - farm type and size
  - debt/equity ratio
  - off-farm income
  - gross farm income

b) Societal or Institutional-Level
  - agricultural policies and programs
  - trade arrangements
  - land use pressures
  - commodity markets
  - agribusiness pressures/innovations
  - incentive/support programs in soil and water conservation

Nowak (1983) modified the Rogers (1983) traditional adoption-diffusion model to reflect the incentives and constraints influencing farmers' decision-making in soil and water conservation. In addition to the above-noted social and economic factors that affect the farmer's awareness, trial and adaptation of conservation practices are the physical and ecological characteristics of the farm and the characteristics of the conservation technology or practice itself.

These factors are then influenced by broader forces including:

- educational and technical assistance programs;
- conservation technology research and development;
- economic incentives (availability and quantity);
- agricultural markets; and,
- other institutional and policy initiatives.

When all these factors are taken into consideration, it becomes evident that there are no quick, technological solutions that are widely applicable and acceptable for all erosion control situations and for all farm management contexts. As a case in point, research conducted by Smithers and Smit (1989) noted a wide range of barriers to adoption experienced by southwestern Ontario farmers; most commonly was the *"perceived inadequacy of technologies, perceived lack of need for practices, financial constraints relating to investment capital and foregone income, and the difficulty of incorporating specific practices into existing management systems"*.

In light of the many factors influencing attitudes and ultimately behavioural responses towards conservation practices, it is helpful to consider how attitudes are formed, as well as the relationship between attitudes and behaviour.

Attitudes are comprised of three basic components - cognitive, affective and behavioural. The cognitive refers to ideas and beliefs that an individual has about an object or situation. The affective refers to associated feelings and emotions, and the behavioural refers to the tendency to take action in response to the thinking and feeling that has previously taken place (Oskamp, 1977). An attitude can be described as a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object (Ajzen and Fishbein, 1975).

Attitudes are formed in many ways, but ten factors are prevalent, including: 1. personality traits; 2. socio-cultural system; 3. knowledge; 4. needs; 5. communication skills; 6. actual communication; 7. source of communication; 8. income/status; 9. education, and; 10. the perceived characteristics of the response being advocated (DeLozier, 1976).

Attitudes affect behavioural change throughout the innovation decision-making process. The relationship between attitudes and behaviour is seldom perfectly correlated, but the relationship is enhanced by direct experience (eg. the testing of an idea) and when group norms sanctioning certain behaviour are present (Kennaley, 1986).

3.0 METHODOLOGY

Tracking attitudinal change took several different forms throughout the life span of the PWS. The majority of data collection efforts focussed on personal interviews of the cooperators. The specific techniques and timing, the accompanying rationale, and the location in the report of the survey instruments are noted chronologically in Table 1.

Data were analyzed at a number of different levels, including: pairs of test and control sub-watersheds; among all three test sub-watersheds, and; grouped test versus grouped control sub-watersheds.

Cross-sectional (point-in-time) and longitudinal (ongoing through time) analyses were conducted for relevant variables in assessing attitude change over time. Where longitudinal analyses were conducted, only those cooperators responding to both the baseline survey (June 1988) and the concluding survey (January/February 1992) were included in the data set to ensure that the findings reflect accurately and consistently, individual attitude change over the full course of the project.

Descriptive statistics such as response frequencies and means are used in presenting the survey results. When comparison of survey results of the same attitude variable over time (longitudinal analysis) was undertaken, the SPSSx/PC "paired t-test" output was used to test for significance of the difference between the means at the 95 percent confidence level. The t-test can be used for small sample sizes (<30) and where the distribution of the sample population is normal (Kurtz, 1983). In this case, we have virtually 100 percent coverage.

The reader should note that the cooperators in the control sub-watersheds, although not employing new conservation practices within the sub-watershed boundaries, had access to project equipment and some technical advice for lands outside the boundaries. One must assume that their thinking towards conservation was therefore shaped to some degree by the formal and informal links they had with the project team and their test cooperator neighbours. No true "control" areas was included in the PWS; that is, an area completely outside the influence of the PWS.

Table 1. Methodology

Data Collection Technique and Timing	Rationale	Location of Survey Instrument
1. June 1988 - Personal interview survey of all cooperators.	• To collect baseline data describing both the test and control sub-watershed cooperator with respect to: • perceptions of on-farm soil erosion problems and sub-watershed water quality • attitudes towards broader environmental and economic issues • community involvement and support for conservation efforts • farm management and personal characteristics data	• Appendix A-1
2. May 1989 - November 1991 - Ongoing attitude change monitoring via documentation of key cooperator observations communicated to the technicians, for the duration of the Pilot Watershed Study	• Approach is based on a qualitative data-gathering technique, participant observation, which *"seeks to go beyond outward appearances, and probes the perceptions, motives, beliefs, values and attitudes of the people involved"* (Casley and Kunar, 1988) • Data sheet allowed technician to continuously categorize casual cooperator observations of reasoning for using, not using or adapting use of specific conservation practices.	• Appendix A-2
3. January 1991 - Personal interview survey of all test cooperators.	• Ensured systematic documentation of the perceptions of all test cooperators regarding reasoning for using or not using specific conservation practices. • Served as a "mid-point" evaluation exercise, providing the basis for fine-tuning program delivery, and to test the format for questions to be asked at the end of the Pilot Watershed Study.	• Appendix A-3

Table 1. Methodology - cont'd

Data Collection Technique and Timing	Rationale	Location of Survey Instrument
4. July 1991 - Equipment use survey of all test cooperators.	• To identify specific problems in the use of the equipment in order that barriers to adoption could be resolved in the final year of the Pilot Watershed Study. • To identify cooperator level of comfort with use of equipment and how they feel their post-Pilot Watershed Study equipment needs could be met.	• Appendix A-4
5. January/February 1992 - Final personal interview survey of test and control cooperators.	• To collect attitudinal data, facilitating comparison with June 1988 and January 1991 survey data. • To obtain perceptions of specific project components contributing to adoption of conservation practices. • To determine cooperator conservation intentions post-Pilot Watershed Study.	• Appendix A-5
6. April 1992 - Watershed technician comments on cooperator participation in the test sub-watersheds.	• To document key decision points in the conservation pilgrimage of selected cooperators who have either implemented numerous practices or have hesitated to implement them.	

4.0 FINDINGS AND DISCUSSION

As noted above, a considerable amount of attitudinal data was collected during the PWS. In this section the data are synthesized using the objectives as a framework for discussion.

A high response rate in the 1992 cooperator personal interview survey was achieved: 91 percent in Essex; 90 percent in Kettle, and; 100 percent in Pittock. Four cooperators were unavailable during the interview period.

4.1 Attitude Change Towards the Extent of On-Farm Erosion and Local Water Quality

Similar questions were asked of the test and control cooperators in both 1988 and 1992 about the extent to which they perceived soil erosion/degradation to be a problem on land they farmed within the sub-watershed. A question was also asked about their perception of water quality in the sub-watershed where they farm.

Table 2 shows the changes in perception over time within a given sub-watershed and as aggregated for all control and test sub-watersheds. Across all test and control sub-watersheds the perception is that improvements, albeit small, in most categories of soil degradation, have occurred. One consistent exception is "soil compaction"; in each of the test sub-watersheds, it is perceived to increase. This may reflect the observations of cooperators using no-till (especially in Essex and Kettle) which, due to the lack of annual tillage, is known to increase soil bulk density.

Kettle test cooperators indicated the largest increase (a significant increase) in soil compaction. However, this is not necessarily a negative observation as most of the Kettle cooperators expressed satisfaction with firm soil conditions for drilling no-till wheat following soybean harvest in a wet fall (eg. 1990). Test cooperators were generally pleased with their no-till wheat yields even when planted under these conditions.

Table 2. Cooperators Perceptions of Soil and Water Quality Change, 1988 to 1992 - Comparison of Means

Topic[1]	Essex Control		Essex Test		Kettle Control		Kettle Test		Pittock Control		Pittock Test		All Control Watersheds		All Test Watersheds	
	88	92	88	92	88	92	88	92	88	92	88	92	88	92	88	92
1. Yield decreases on knolls or water runs	1.8	1.8	1.8	1.6	2.3	2.0	2.7	2.7	1.8	1.7	1.7	1.6	1.9	1.8	2.0	1.9
	(n=6)		(n=9)		(n=4)		(n=9)		(n=9)		(n=9)		(n=19)		(n=27)	
2. Soil washing away (tile outlets, streambanks)	2.6	2.2	2.1	1.9	1.7	1.3	1.9	2.1	1.4	1.1	1.6	1.3	1.8	1.5	1.9	1.8
	(n=5)		(n=10)		(n=3)		(n=9)		(n=8)		(n=9)		(n=16) ▨		(n=28)	
3. Soil compaction	2.3	2.2	2.1	2.2	1.8	1.8	1.7	2.1	2.2	1.5	1.9	2.0	2.2	1.8	1.9	2.1
	(n=6)		(n=10)		(n=4)		(n=9) ▨		(n=10) ▨		(n=9)		(n=20)		(n=28) ▨	
4. Wind erosion	1.2	1.6	1.1	1.1	1.3	1.3	1.6	1.6	1.3	1.0	1.4	1.4	1.3	1.3	1.4	1.4
	(n=6)		(n=9)		(n=4)		(n=9)		(n=9)		(n=9)		(n=19)		(n=27)	
5. Eroded soil in drainage ditches	2.5	2.0	1.9	1.8	1.7	2.3	2.4	1.9	1.4	1.2	1.2	1.2	1.8	1.6	1.9	1.6
	(n=6)		(n=10)		(n=3)		(n=9)		(n=8)		(n=9)		(n=17)		(n=28)	
6. Seasonal rills or small gullies	1.8	1.5	1.8	1.7	2.0	2.5	2.7	2.3	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.0
	(n=6)		(n=9)		(n=4)		(n=9)		(n=10)		(n=8)		(n=20)		(n=26)	
7. Overall extent of erosion on your farm	2.0	2.3	2.1	1.9	2.3	2.5	2.6	2.4	2.1	2.0	2.1	1.9	2.1	2.2	2.3	2.1
	(n=6)		(n=10)		(n=4)		(n=9)		(n=9)		(n=9)		(n=19)		(n=28)	
8. Water quality has been improving during past 5 years[2]	4.0	2.0	2.7	2.5	3.0	3.0	3.8	1.8	3.5	3.5	4.5	2.0	3.6	3.0	3.4	2.2
	(n=2)		(n=6)		(n=1)		(n=5) ▨		(n=4)		(n=2)		(n=7)		(n=13) ▨	

▨ paired t-test statistical analysis showed significant difference between the means of the two years at the 95 percent confidence level.

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[1] The mean scores are based on the following scale for responses to:

Topics #1-6: 1 = not at all, 2 = some occurrence, 3 = regular occurrence, 4 = extensive occurrence
Topic #7 1 = not at all, 2 = slight occurrence, 3 = serious occurrence
Topic #8 1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree,
5 = strongly disagree, 0 = don't know

[2] Low number of respondents reflects the number answering "don't know" (zeros were not calculated in the mean), and the relatively few individuals who responded in both 1988 and 1992.

Of note is the trend in the results for topic #7 - the overall extent to which the cooperators perceive soil erosion to be occurring on land they farm within the sub-watershed (Table 2). All three test watersheds reported a slightly lower level of perceived erosion in 1992 relative to 1988. Control sub-watersheds in Essex and Kettle perceived a slight increase in erosion. This is illustrated in Figure 3. The combined data for all control sub-watersheds show a slight increase in perceived erosion since 1988 whereas the combined data for the test watersheds indicate a slight decrease in perceived erosion.

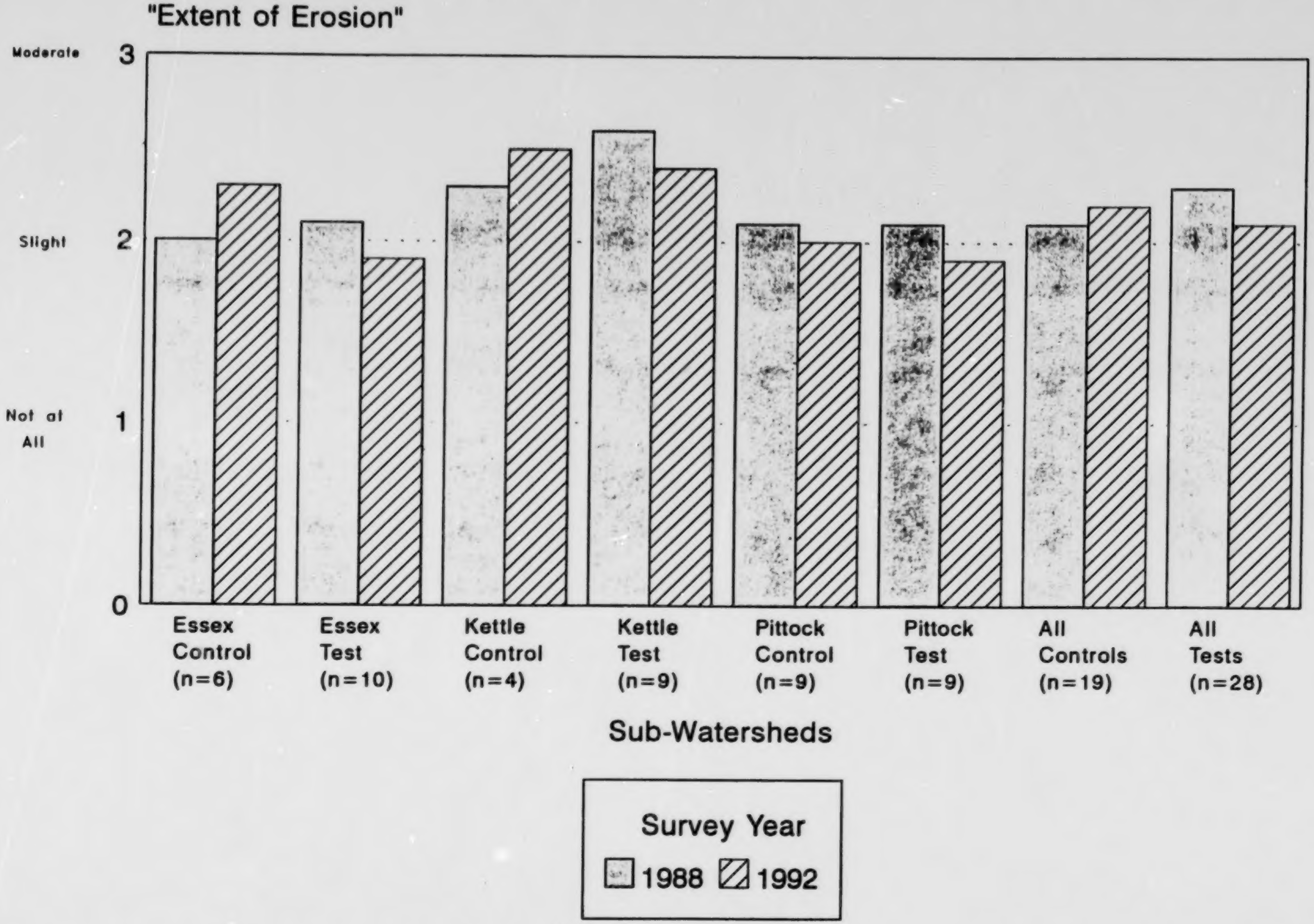
Cooperators were also asked if they felt water quality in their respective sub-watersheds had improved over the preceding 5 years. Due to the low number of respondents who provided useable responses (see Table 2), the data must be interpreted cautiously. However, the paired t-test of significant difference between the means indicates that Kettle test sub-watershed cooperators and the combined test sub-watershed cooperators perceived there to be a significant improvement in water quality over the past 5 years relative to the years prior to the baseline survey (1988). This is illustrated in Figure 4.

4.2 Attitude Change Towards the Merits of Conservation Practices and Degree of Risk Acceptance

Cooperators in both 1988 and 1992 were asked for their opinions about the merits of soil conservation practices, their perceptions of who should be paying for erosion control, and their willingness to accept risk related to implementing conservation practices.

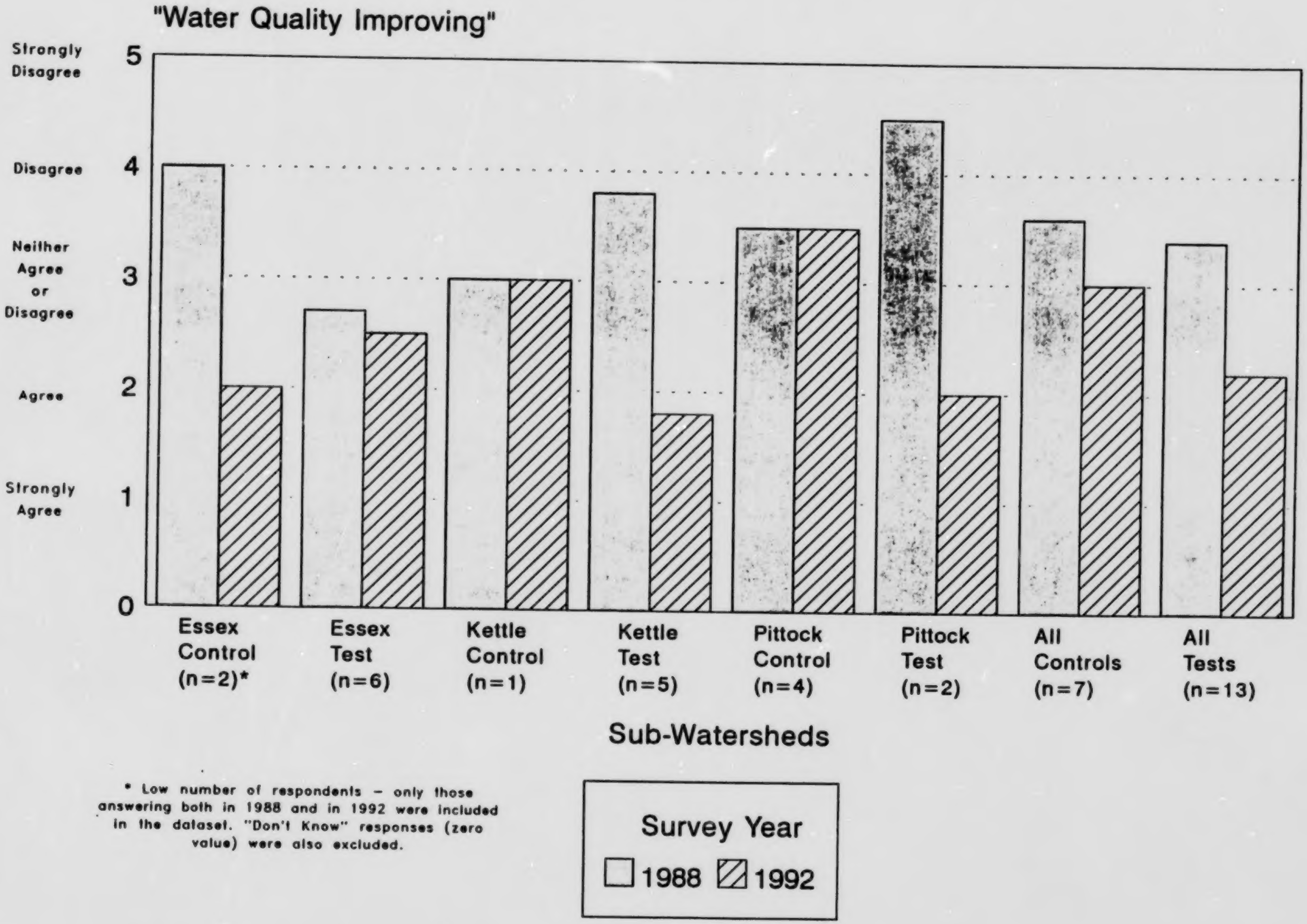
Average responses for each sub-watershed are noted in Table 3. Responses indicate that in all sub-watersheds, cooperators generally agree that "conserving soil and water is a good investment for their area". It is important to note that the strongest affirmative responses and the most positive change in responses since 1988 were provided by cooperators in the Essex and Kettle test sub-watersheds. Although still agreeing with the statement in 1992, Pittock test sub-watershed cooperators responded less favourably to the statement than they did in 1988. This may reflect the more positive conservation experience realized by cooperators in Kettle and Essex as indicated by higher levels of practice adoption (see PWS report - Implementation of Conservation Systems) and by greater Essex and Kettle cooperator interest expressed in long-term access to equipment.

FIGURE 3 : COOPERATOR PERCEPTION OF THE EXTENT OF EROSION ON "THEIR" FARM



Source: Cooperator Surveys 1988 and 1992

FIGURE 4 : COOPERATOR PERCEPTION OF WATER QUALITY "IMPROVING" DURING THE PREVIOUS FIVE YEARS



* Low number of respondents – only those answering both in 1988 and in 1992 were included in the dataset. "Don't Know" responses (zero value) were also excluded.

Source: Cooperator Surveys 1988 and 1992

Table 3. **Cooperator Perceptions of Conservation Practice Merits and Risk Acceptance, 1988 to 1992 - Comparison of Means**

Topic[1]	Essex Control		Essex Test		Kettle Control		Kettle Test		Pittock Control		Pittock Test		All Control Watersheds		All Test Watersheds	
	88	92	88	92	88	92	88	92	88	92	88	92	88	92	88	92
1. Conserving soil and water in this area is a good investment	1.8	1.8	1.9	1.2	1.8	2.0	1.3	1.1	1.8	1.6	1.4	1.9	1.8	1.8	1.6	1.7
	(n=6)		(n=9)		(n=4)		(n=9)		(n=10)		(n=9)		(n=20)		(n=27)	
2. In general, costs to the farmer of soil conservation are greater than the on-farm benefits	3.5	3.3	2.6	3.0	2.7	2.3	3.3	3.6	3.2	3.2	3.6	3.7	3.2	3.0	3.2	3.4
	(n=4)		(n=8)		(n=3)		(n=9)		(n=6)		(n=7)		(n=13)		(n=24)	
3. Society should pay more for agricultural pollution control	2.7	3.7	1.9	1.9	2.7	2.7	2.3	2.5	2.3	2.5	2.2	2.9	2.5	2.9	2.1	2.4
	(n=6)		(n=8)		(n=3)		(n=8)		(n=8)		(n=9)		(n=17)		(n=25)	
4. I am reluctant to accept conservation practices until I see them working for others	2.7	2.8	2.9	3.5	2.8	3.0	3.8	3.8	2.6	2.6	3.0	3.3	2.6	2.7	3.2	3.5
	(n=6)		(n=10)		(n=4)		(n=8)		(n=9)		(n=9)		(n=19)		(n=27)	
5. Of my neighbours, I would be among the first few to try a conservation practice	2.8	2.5	2.9	2.5	2.5	3.3	2.3	2.6	2.4	3.2	2.6	2.8	2.6	3.0	2.6	2.6
	(n=6)		(n=10)		(n=4)		(n=9)		(n=9)		(n=9)		(n=19)		(n=28)	
6. I feel a moral obligation to prevent soil loss due to erosion	1.7	2.8	2.1	2.1	1.8	2.0	1.8	1.6	1.7	1.6	1.8	1.7	1.7	2.1	1.9	1.8
	(n=6)		(n=10)		(n=4)		(n=9)		(n=9)		(n=9)		(n=19)		(n=28)	

Note: There were no significant differences between the means of the two years at the 95 percent confidence level, using a paired t-test analysis.

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[1] The mean scores are based on the following response scale:
1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, 5 = strongly disagree, 0 = don't know (not calculated in the mean score)

Responses to the comment, "cost to the farmer of soil conservation are greater than the on-farm benefits" were generally neutral (neither agreement nor disagreement). However, in all three test sub-watersheds, there was a trend toward disagreement with the statement, relative to how they responded in 1988. This is consistent with responses in Section 4.4 which suggest that cooperators are fairly confident that conservation practices are contributing positively to farm profitability.

In response to the statement, "society should pay more for agricultural pollution control", the trend across both control and test watersheds is to be less in agreement with the statement in 1992 than in 1988. This may reflect a realization that farmers themselves can profitably implement conservation practices and, in the long term, rely less on public funding once a certain level of experience is gained.

Topics #4 and #5 relate to cooperators' assessment of risk associated with conservation practices, and their willingness to accept risk as measured by the initiative they see themselves taking with conservation practices relative to others such as neighbours. Many of the average responses to both statements centered around the value "3 - neither agree nor disagree". Even in 1988, test cooperators in general tended to disagree more than the control cooperators with the statement that they were "reluctant to accept conservation practices until seen working for others". This may reflect the results of the sub-watershed selection process in which risk acceptance was one of the criteria for selecting the test sub-watersheds. Alternatively it may reflect their willingness to consider practices in preparation for the first farm planning meetings which were scheduled shortly after the 1988 survey was administered. The most consistent attitude change over time appears to have occurred with the Essex test cooperators where they have tended to move from a position of neutrality (2.9) in 1988, to disagreeing with the "reluctance" statement (3.5) and agreeing with being "among the first few" (2.5) to try practices in 1992.

There appear to be few differences among sub-watersheds or between years in response to the question about "moral obligation" to prevent soil loss. On average, there was agreement with this statement (number six) in Table 3.

4.3 Cooperator Reasoning for Continued Use or Disuse of Conservation Practices

Several sources of information were used to assess cooperator reasons for using or discontinuing conservation practices: the 1991 and 1992 cooperator surveys (survey instruments in Appendices A-3 and A-5), the attitude change data collected by the watershed technicians (data collection sheet in Appendix A-2), and the case studies.

1991 AND 1992 COOPERATOR SURVEY RESULTS

Two questions were asked in the 1991 and 1992 surveys which allowed clarification of cooperator rationale for using or not using specific practices in the 1990 and 1991 cropping seasons respectively. Respondents were asked to identify the main reasons they were "continuing to work with" conservation practices, and subsequently, the main reasons for deciding not to try, or discontinuing the use of specific practices.

The reason or "factor and sub-factor" categories potentially influencing decision-making are noted in Table 4. Tables 5 to 10 identify the reasons or main factors influencing cooperator choice of conservation practice for each type of practice in each test sub-watershed for 1991 and 1992. The "+" and "-" indicates whether the factor encouraged or inhibited adoption.

The following comments summarize the main shifts in cooperator thinking in each of the sub-watersheds over these two years.

Essex

In 1991, 60 percent of all reasons given for considering practices were related to biophysical reasons (e.g. good for the land base) or personal reasons (e.g. many were not willing to consider implementing structures/land management practices). In 1992, 65 percent of all reasons were related to economics or farm management. This suggests that cooperators had moved fairly quickly to examining the economic advantages of alternative practices and weeding out practices which did not fit their system. Note that no respondents reported being discouraged from using no-till for economic reasons in the 1992 survey, although some were discouraged for farm management reasons. Also in the 1992 survey, cooperators were less enthused about cereal underseeded to red clover and the modified moldboard plow than

Table 4. Cooperator Perceptions/Attitudes - Factors and Sub-Factors

Biophysical

1. landbase (soil, topography, etc.)
2. weather
3. other . . . .

Economics

4. return on investment
5. yield effects
6. inputs - time, labour, fuel, chemicals, wear and tear etc.
7. financial lender or farm owner/manager disapproves
8. other . . . .

Farm Management

9. fits with current cropping practices/systems
10. fits with current machinery complements
11. general feeling that it's too much bother/hassle to try
12. other . . . .

Technology

13. feeling that technology is unproven for farm specific conditions
14. other . . . .

Personal Attitudes

15. general feeling that it's too risky to try
16. not enough of an erosion/degradation problem to try it

Personal Attitudes continued

17. knows someone else who tried it and had problems (note who and where)
18. need to stop a particular problem
19. have seen it work for someone also (who and where)
20. will do it for ethical/stewardship reasons
21. other . . . .

Community

22. idea is unacceptable in this area/community
23. other people in the community are trying it (note who)
24. other . . . .

Project related

25. financial incentives
26. technical advice
27. availability of project equipment
28. other . . . .

External Factors

29. Conservation meetings (non-SWEEP)
30. other . . . .
31. Other . . . .

Table 5. Main Reasons for Cooperator Choice of Conservation Practices - "Essex" - 1991 Survey (1990 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (FREQUENCY OF MENTION)																Total Responses		Total Responses per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	No.	%
A. Cropping Systems																				
1. winter cover grown for crop	7				5												12	0	12	8
2. winter cover tilled in spring	1	2				6				2			1				2	10	12	8
3. cereal underseeded to red clover/alfalfa	10		1		1	2											12	2	14	9
4. other	1																1	0	1	1
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow	2	1				1		2	1				4				7	4	11	7
6. chisel plow	7	1	3					1	2								12	2	14	9
7. disc or cultivate	5		2		2	1			1				1				11	1	12	8
8. no-till	1		1			1	1	2	1	2			3	1			7	6	13	9
9. no fall tillage	7	2	1			1							1				9	3	12	8
10. other	1									1							1	1	2	1
C. Land Management																				
11. grassed waterway	3	1		1	2	2				4			1		1		7	8	15	10
12. buffer strip	2			1					1	8			1				4	9	13	9
13. berms	1			1					1	6			1			1	3	8	11	7
14. rock chutes	3								1						3		7	0	7	5
15. other	2		1														3	0	3	2
Totals	53	7	9	3	10	14	1	5	8	23	0	0	13	1	4	1	98	54	152	101
Total Responses Per Factor	60		12		24		6		31		0		14		5		152			
Percent of Total	40		8		16		4		20		0		9		3		100			

Table 6. Main Reasons for Cooperator Choice of Conservation Practices - "Essex" - 1992 Survey (1991 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS																Total Responses		Total Responses Per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	No.	%
A. Cropping Systems																				
1. winter cover crop grown for crop	3				8	2										2	11	4	15	15
2. winter cover tilled in spring			1	1	1	6				1							2	8	10	10
3. cereal underseeded to red clover/alfalfa			2	1	1	7			1							1	4	8	12	12
4. other																				
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow		3		3	2	4							4			1	6	11	17	16
6. disc/coulter chisel plow	1		2	2	2	3		1					3				8	6	14	13
7. disc or cultivate	3		3	2		1											6	3	9	9
8. no-till			6			3							3	1			9	4	13	13
9. no fall tillage	2	2	2	1		2										1	4	6	10	10
10. other																				
C. Land Management																				
11. grassed waterway													1				1	0	1	1
12. buffer strip													1				1	0	1	1
13. berms																				
14. tile outlet protection																				
15. other structures									1								1	0	1	1
Totals	9	5	16	9	14	28	0	1	2	1	0	0	12	1	0	5	53	50	103	101
Total Responses Per Factor	14		25		42		1		3		0		13		5		103			
Percent of Total Responses	14		24		41		1		3		0		13		5		101			

Table 7. Main Reasons for Cooperator Choice of Conservation Practices - "Kettle" - 1991 Survey (1990 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (FREQUENCY OF MENTION)																Total Responses		Total Responses per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	No.	%
A. Cropping Systems																				
1. winter cover grown for crop	3		4		5												12	0	12	9
2. winter cover tilled in spring	3	3		3		4											3	10	13	9
3. cereal underseeded to red clover/alfalfa	7		2			1											9	1	10	7
4. other	2																2	0	2	1
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow						4		2					4			1	4	7	11	8
6. chisel plow	3		2		1	2			1	1			2				9	3	12	9
7. disc or cultivate	3		4	1	4	1		1									11	2	13	9
8. no-till	1		2	2		1		1	1				5				9	4	13	9
9. no fall tillage	4	1		5	2					1							6	7	13	9
10. other		1															0	1	1	1
C. Land Management																				
11. grassed waterway	5	1							2	1		1	2	1			9	4	13	9
12. buffer strip	8								1	2			1				10	2	12	9
13. berms	2	1		1					1	6			1				4	8	12	9
14. rock chutes	1												1				2	0	2	1
15. other	1																1	0	1	1
Totals	43	7	14	12	12	12	0	4	6	11	0	1	16	1	0	1	91	49	140	100
Total Responses Per Factor	50		26		24		4		17		1		17		1		140			
Percent of Total	36		19		17		3		12		1		12		1		101			

Table 8. Main Reasons for Cooperator Choice of Conservation Practices - "Kettle" - 1992 Survey (1991 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS																Total Responses		Total Responses Per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	No.	%
A. Cropping Systems																				
1. winter cover crop grown for crop	6		2		3												11	0	11	8.5
2. winter cover tilled in spring	2	3		1		5											2	9	11	8.5
3. cereal underseeded to red clover/alfalfa	5			1	1	4											6	5	11	8.5
4. other																				
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow	3		1	1	1	1		3		1							5	6	11	8.5
6. disc/coulter chisel plow	4	1	2			2							2				8	3	11	8.5
7. disc or cultivate		4			2	3		2									2	9	11	8.5
8. no-till	4		5										1				10	0	10	8.0
9. no fall tillage	2	5	1	1	1					1							4	7	11	8.5
10. other																				
C. Land Management																				
11. grassed waterway	5					1				3							5	4	9	7.0
12. buffer strip	5	2			1					3							6	5	11	8.5
13. berms	1	2						1		4			2				3	7	10	8.0
14. tile outlet protection	3			1						5			2				5	6	11	8.5
15. other structures	1								1								2	0	2	1.5
Totals	41	17	11	5	9	16	0	6	1	17	0	0	7	0	0	0	69	61	130	101
Total Responses Per Factor	58		16		25		6		18		0		7		0		130			
Percent of Total Responses	45		12		19		5		14		0		5		0		100			

Table 9. Main Reasons for Cooperator Choice of Conservation Practices - "Pittock" - 1991 Survey (1990 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (FREQUENCY OF MENTION)																Total Responses		Total Responses per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	No.	%
A. Cropping Systems																				
1. winter cover grown for crop	2				7				1								10	0	10	10
2. winter cover tilled in spring	2			3	1	1		1	1	1							4	6	10	10
3. cereal underseeded to red clover/alfalfa	1				6												7	0	7	7
4. other			1														1	0	1	1
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow					1	1							8			1	9	2	11	11
6. chisel plow					3				3	1			3				9	1	10	10
7. disc or cultivate			3		5					2							8	2	10	10
8. no-till				1		3				2			4		1		5	6	11	11
9. no fall tillage	2				6			1	2								10	1	11	11
10. other																				
C. Land Management																				
11. grassed waterway	1								4	1							5	1	6	6
12. buffer strip	1								2	2							3	2	5	5
13. berms	1								2	4							3	4	7	7
14. rock chutes										1							0	1	1	1
15. other	1								1								2	0	2	2
Totals	11	0	4	4	29	5	0	2	16	14	0	0	15	0	1	1	76	26	102	102
Total Responses Per Factor	11		8		34		2		30		0		15		2		102			
Percent of Total	11		8		33		2		29		0		15		2		100			

Table 10. Main Reasons for Cooperator Choice of Conservation Practices - "Pittock" - 1992 Survey (1991 Cropping Season)

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS																Total Responses		Total Responses Per Practice	
	Biophysical		Economics		Farm Management		Technology		Personal		Community		Project		External					
	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	No.	%
A. Cropping Systems																				
1. winter cover crop grown for crop					8												8	0	8	9
2. winter cover tilled in spring	3	1				2											3	3	6	7
3. cereal underseeded to red clover/alfalfa	2				4	1											6	1	7	8
4. other																				
B. Tillage and Planting Practices																				
5. modified/adjusted moldboard plow	6	1			1	1							1				8	2	10	12
6. disc/coulter chisel plow	3	1	1		1	1			1								6	2	8	9
7. disc or cultivate	1			1						1							1	2	3	3
8. no-till	1	2	1		1				1	2			1				5	4	9	10
9. no fall tillage	4				1	1			2								7	1	8	9
10. other	1																1	0	1	1
C. Land Management																				
11. grassed waterway						1			2	4							2	5	7	8
12. buffer strip									2	4			1				3	4	7	8
13. berms									1	4							1	4	5	6
14. tile outlet protection									1	3							1	3	4	5
15. other structures									3	1							3	1	4	5
Totals	21	5	2	1	16	7	0	0	13	19	0	0	3	0	0	0	55	32	87	100
Total Responses Per Factor	26		3		23		0		32		0		3		0		87			
Percent of Total Responses	30		3		26		0		37		0		3		0		99			

in the 1991 survey. This may indicate a preference for residue enhancement through no-till as they improve their skills. By the time of the 1992 survey, cooperators gave few reasons, positive or negative, related to land management/structures options relative to the 1991 survey. This suggests that the structures options were discussed early in the PWS.

Kettle

The proportions of responses allocated to the different factors remains similar in 1992 compared with 1991, the highest being appreciation for practice benefits to the land base. Within the biophysical factor, more negative attributes are given to "disc or cultivate" and "no fall tillage" in 1992 relative to 1991. The proportion of positive economic comments tonegative comments is higher in 1992, led by no-till which received no negative responses. Personal factors discouraging adoption of structures predominate in 1992. This may indicate that the cooperators have installed the structures they feel are necessary and are now preferring to work with tillage practices which minimize the need for additional structures. Continuing positive factors related to the chisel plow and an increase in the positive factors associated with no-till indicated in the 1992 survey would support this conclusion. Use of the disc or cultivator as a primary tillage implement appeared to fall into disfavor in 1992.

Pittock

The biggest change in the 1992 survey relative to the 1991 survey was the apparent increase in positive biophysical factors influencing cooperator decisions, especially tillage and planting practices. It was noted in the PWS report Study Area Selection, Description and Climate that among the three watersheds, Pittock farmers indicated fewer soil erosion problems on their farms prior to implementation of the PWS. Since the PWS has run its course, there may now be a recognition that improvements to the land resource could occur with conservation practices. Perspectives on minimum tillage and no-till (cooperators note both positive and negative attributes) appear to have changed little over the two years. Similarly, the farmers feel little need for land management structures.

Interestingly, where conservation practice adoption is the highest (Essex and Kettle), cooperators cite the PWS as a continuing positive factor in their decision-making. The technicians in these watersheds reported continued cooperator interest in fine-tuning their systems - hence the reason for contact by the technician.

In all three test watersheds, the proportion of total factors which are positive or encouraging of conservation practices is lower in 1992 than in 1991. One possible explanation is that cooperators had fairly high expectations of soil conservation practices at the beginning of the PWS. They may now realize the need to fine-tune and fully integrate the practices into their management systems. Perhaps the producers now more clearly see the obstacles that must be overcome in order to achieve this goal.

Rarely did respondents choose "technology", "community", or "external" factors as influencing their decisions one way or another. There was some overlap between sub-factors in "farm management" and "technology" and in "personal" and "community" which may account for this. Alternatively, respondents may not have sensed community approval or disapproval or, if they did, would not admit it.

WATERSHED TECHNICIAN DATA COLLECTION RESULTS

Some shifts in thinking over time in each of the test sub-watersheds are evident from the data collected informally by the watershed technicians. Tables 11 to 13, show the number of positive and negative comments documented for each conservation practice by test sub-watershed in 1989, 1990 and 1991. Some observations follow.

- Virtually no negative (constraining) comments were recorded in any of the sub-watersheds for cropping system practices in 1990 and 1991. This suggests that the practices are well accepted by the cooperators and do not therefore require further discussion. However, the cooperator survey in January 1992 did reveal some hesitation in Essex about underseeding crops and then having to deal with a living cover crop the following spring.

- In Essex, there was a clear shift away from discussions about the moldboard plow and the chisel plow to discussions about no-till in general, and more specifically to the conservation drill and planter (Table 11). Almost exclusively, such discussions were positive about the use of this equipment.

Table 11. Trends in Total Positive and Negative Comments Associated with Practices - Essex

ESSEX TEST	TOTAL POSITIVE COMMENTS/ PRACTICE						TOTAL NEGATIVE COMMENTS/PRACTICE						TOTAL COMMENTS COMMENTS/PRACTICE					
	1989		1990		1991		1989		1990		1991		1989		1990		1991	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
A. Cropping Systems																		
1. winter cover for crop	7	18											7	18				
2. winter cover spring tilled	1	3											1	3				
3. cereal underseeded																		
4. other																		
B. Tillage/Planting Practices																		
1. mod./adj. moldboard plow	6	16									1	14	6	15			1	1
2. chisel plow	8	21			8	11							8	21			8	10
3. disc/cultivate	1	3			5	7							1	3			5	6
4. conservation drill	4	10	16	30	24	32	1	100	1	50			5	13	17	31	24	30
5. conservation planter	4	10	7	13	13	18					2	29	4	10	7	13	15	18
6. no fall tillage	1	3	5	9									1	3	5	9		
7. no-till[a]			24	45	24	32			1	50	4	57			25	45	28	35
8. other																		
C. Land Management Practices[b]																		
1. grassed waterway																		
2. buffer strip	6	16											6	15				
3. berms																		
4. rock chutes			1	2											1	2		
5. other																		
Totals	38	100	53	99	74	100	1	100	2	100	7	100	39	101	55	100	81	100

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[a] The general category of "no-till" was covered by "conservation drill" and "conservation planter" in 1989.

[b] In 1989, cooperator comments on grassed waterway and buffer strips were grouped, as were comments on berms and rock chutes.

Table 12. Trends in Total Positive and Negative Comments Associated with Practices - Kettle

KETTLE TEST	TOTAL POSITIVE COMMENTS/ PRACTICE						TOTAL NEGATIVE COMMENTS/PRACTICE						TOTAL COMMENTS COMMENTS/PRACTICE					
	1989		1990		1991		1989		1990		1991		1989		1990		1991	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
A. Cropping Systems																		
1. winter cover for crop	4	6	1	2	1	2							4	4	1	1	1	1
2. winter cover spring tilled							1	3					1	1				
3. cereal underseeded							2	7					2	2				
4. other							2	7					2	2				
B. Tillage/Planting Practices																		
1. mod./adj. moldboard plow	17	24					6	21	6	25			23	23	6	8		
2. chisel plow	2	3	9	17	2	3	2	7	1	4			4	4	10	13	2	3
3. disc/cultivate																		
4. conservation drill	24	34	27	51	21	31	8	28	7	29	2	22	32	32	34	44	23	30
5. conservation planter	1	1	7	13	12	18	7	24	2	8	5	56	8	8	9	11	17	22
6. no fall tillage	1	1	2	4	3	4	1	3					2	2	2	3	3	4
7. no-till[a]			3	6	23	34			4	17	2	22			7	9	25	32
8. other				1													1	1
C. Land Management Practices[b]																		
1. grassed waterway	7	10							2	8			7	7	2	3		
2. buffer strip									1	4					1	1		
3. berms	14	20	3	6									14	14	3	4	3	4
4. rock chutes			1	2	3	4			1	4					2	3	2	3
5. other					2	3												
Totals	70	99	53	101	68	99	29	100	24	99	9	100	99	99	77	100	77	100

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[a] The general category of "no-till" was covered by "conservation drill" and "conservation planter" in 1989.

[b] In 1989, cooperator comments on grassed waterway and buffer strips were grouped, as were comments on berms and rock chutes.

Table 13. Trends in Total Positive and Negative Comments Associated with Practices - Pittock

PITTOCK TEST	TOTAL POSITIVE COMMENTS/ PRACTICE						TOTAL NEGATIVE COMMENTS/PRACTICE						TOTAL COMMENTS COMMENTS/PRACTICE					
	1989		1990		1991		1989		1990		1991		1989		1990		1991	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
A. Cropping Systems																		
1. winter cover for crop	2	5	1	5									2	4	1	2		
2. winter cover spring tilled					1	3											1	2
3. cereal underseeded																		
4. other											1	4					1	2
B. Tillage/Planting Practices																		
1. mod./adj. moldboard plow	3	9	3	14	2	5	3	20	7	23	5	21	6	12	10	19	7	11
2. chisel plow	3	9			2	5	4	27	2	7	3	13	7	14	2	4	5	8
3. disc/cultivate																		
4. conservation drill	7	20			20	54					1	4	7	14			21	34
5. conservation planter	6	17	11	50	7	19	6	40	4	13	4	17	12	24	15	28	11	18
6. no fall tillage	3	9									1	4	3	6			1	2
7. no-till[a]					1	3			1	3	4	17			1	2	5	8
8. other			5	23	1	3			3	10	3	13			8	15	4	7
C. Land Management Practices[b]																		
1. grassed waterway	8	23					1	7	6	19			9	18	6	11		
2. buffer strip									8	26					8	15		
3. berms	3	9	2	9									3	6	2	4		
4. rock chutes																		
5. other					3	8	1				2	8	1	2			5	8
Totals	35	101	22	101	37	100	15	101	31	101	24	101	50	100	53	100	61	100

[a] The general category of "no-till" was covered by "conservation drill" and "conservation planter" in 1989.

[b] In 1989, cooperator comments on grassed waterway and buffer strips were grouped, as were comments on berms and rock chutes.

- In Kettle Creek (Table 12), no positive comments were recorded in 1990 or 1991 regarding the modified/adjusted moldboard plow. This is in marked contrast to 1989 when 24 percent of all positive comments pertained to this practice. Based on technician reporting in 1990 and 1991, many cooperators questioned whether this was the best means to achieve residue cover goals. On the other hand, many positive comments were received in relation to the conservation planter, drill and no-till in general in both 1990 and 1991 (83% of all positive comments in 1991).

The relatively few negative comments received in 1991 all related to no-till practices, which suggest continuing fine-tuning of these systems.

- In Pittock (Table 13), there was a similar number of positive comments in 1989, 1990 and 1991 about the modified/adjusted moldboard plow; however, more negative comments were received in 1990 and 1991. More positive and fewer negative comments about the conservation planter were recorded in 1990. Twenty percent of all positive comments received in 1989 were about the conservation drill; none were received in 1990, partly because of the wet fall which prevented the use of the drill. However, in 1991, the majority of positive comments were directed to the conservation drill used for both wheat and soybean planting. The "other" tillage practice in 1990 refers primarily to inter-row cultivation; several cooperators were inclined to use this practice in conjunction with banding herbicides, but felt constrained by the lack of equipment available through the project.

- Comments in 1989 about land management practices were largely positive. Implementation of these practices was largely completed in 1989. By 1990, cooperators appeared unwilling to consider additional structures as evidenced by more negative comments in 1990. By 1991, very few comments, positive or negative, were received on land management practices.

WATERSHED TECHNICIAN COMMENTS AND PERCEPTIONS

In each watershed, the technicians were asked to provide their comments on why some cooperators demonstrated significant progress along the adoption scale and others did not. Some highlights from these comments relative to factors affecting adoption, follow.

Inhibiting Factors

- large diversified farms with both cash crop and livestock commodities appeared to have little time for the PWS; they demonstrated little flexibility regarding the timing of equipment use; the problem increased where several operators involved in the same farm could not agree on the value of pursuing conservation practices; manure management under no-till practices was raised as a concern;

- PWS conservation planting equipment sometimes did not mesh with existing cooperator cropping systems; for example, the 30 inch row PWS planter did not fit a 38 inch row combine head;

- individuals who faced a tight farm financial situation were unlikely to change practices if they perceived there to be any associated risk;

- a few individuals perceived the PWS to be a short-term phenomenon and were unwilling to change practices where they were receiving conventional advice from crop consultants who would be around in the long-term.

Supporting Factors

- individuals who were interested in consolidating their equipment complement and who enjoyed working on equipment, were most open to adapting their own planters or using the PWS conservation planting equipment;

- cooperators who were less concerned about maximizing yield than increasing net returns, were more open to possible minor yield decreases if savings on inputs could be achieved;

- cooperators who had tried conservation systems through the PWS were motivated to further conservation activity following conservation farm tours and conservation farming workshops;

- adoption rates of tillage and planting practices were enhanced when seen as complementing existing erosion control structures and where the cooperator was convinced of a problem through the farm planning process;

- success breeds success; where positive experiences were achieved, sometimes under adverse weather conditions (e.g. no-till seeding wheat in weather conditions too wet for conventional practices), adoption rates increased;

- patience and a desire to learn were key positive personal characteristics.

4.4 Cooperator Perception of Change in Effectiveness of Conservation Practices

In the 1991 and 1992 surveys, cooperators were asked to rate their impressions of the effectiveness of conservation practices they have worked with, on a scale of 5 (very positive) to 1 (very negative). For each practice, respondents were asked for their impressions of:

- change in crop yield,
- change in soil erosion control,
- how the practice fits into their farm management system,
- acceptance in the community, and
- effects on profitability of the farm operation.

Comparisons of the means of the responses for each of the two years are given in Table 14. Dramatic changes in cooperator perceptions cannot be expected over a period of only two cropping seasons. However, the following trends are noted.

- Essex cooperators think less positively about yield and profitability impacts of "winter cover tilled in spring" and "cereal underseeded to red clover/alfalfa" in 1992 than in 1991. This may reflect their concern about moisture management in clay soils under heavy residues. Their perception of the yield and profitability impacts is much less positive than the Kettle and Pittock cooperators' perception.

Table 14. Cooperator Impressions of Practices Implemented

PERCEPTION	ESSEX Mean*		KETTLE Mean		PITTOCK Mean		TOTAL Mean	
	1992	1991	1992	1991	1992	1991	1992	1991
1. Winter Cover Crop Grown for Crop								
a) change in crop yield	4.0	3.5	3.8	4.2	3.4	4.3	3.6	3.9
b) change in soil erosion control	3.8	4.5	4.3	4.7	4.6	4.8	4.2	4.6
c) fits into farm management system	4.2	4.3	4.4	4.6	4.8	4.7	4.4	4.4
d) acceptance in the community	4.0	4.1	4.4	4.2	4.1	5.0	4.2	4.3
e) effects on profitability	2.9	3.1	3.4	3.8	4.5	4.0	3.5	3.6
2. Winter Cover Tilled in Spring								
a) change in crop yield	2.5	2.5	4.5	4.5	4.0	3.5	3.7	3.5
b) change in soil erosion control	4.0	4.5	5.0	5.0	4.3	5.0	4.3	4.8
c) fits into farm management system	3.0	3.5	3.5	4.5	4.3	5.0	3.7	4.3
d) acceptance in the community	3.0	4.0	4.0	4.5	3.7	-	3.6	4.3
e) effects on profitability	3.0	3.5	4.0	4.0	4.3	5.0	3.9	4.2
3. Cereal Underseeded to Red Clover/Alfalfa								
a) change in crop yield	3.0	4.3	4.2	4.3	4.0	4.0	3.9	4.3
b) change in soil erosion control	4.0	4.4	4.3	4.2	4.5	4.7	4.3	4.3
c) fits into farm management system	4.3	4.0	4.3	4.0	4.7	5.0	4.4	4.1
d) acceptance in the community	4.3	4.3	4.0	4.3	3.8	5.0	4.0	4.3
e) effects on profitability	3.5	4.0	3.7	3.6	4.7	4.5	4.0	3.9
4. Modified/Adjusted Moldboard Plow								
a) change in crop yield	3.0	3.6	3.0	3.3	3.0	2.8	3.0	3.2
b) change in soil erosion control	3.0	3.9	4.2	4.6	4.0	3.6	3.7	3.9
c) fits into farm management system	3.2	4.1	4.2	5.0	4.3	3.6	3.9	4.0
d) acceptance in the community	2.7	3.1	3.0	3.3	3.7	4.0	3.2	3.3
e) effects on profitability	2.8	3.3	3.4	4.0	3.5	3.2	3.3	3.4

* Based on a 5-point scale ranging from 5 (very positive) to 1 (very negative)

Table 14. Cooperator Impressions of Practices Implemented - cont'd

PERCEPTION	ESSEX Mean*		KETTLE Mean		PITTOCK Mean		TOTAL Mean	
	1992	1991	1992	1991	1992	1991	1992	1991
5. Chisel Plow								
a) change in crop yield	3.2	2.8	3.0	3.3	3.2	2.3	3.1	2.9
b) change in soil erosion control	3.6	4.1	3.9	3.9	3.8	3.9	3.8	4.0
c) fits into farm management system	3.4	3.9	3.9	4.1	4.3	3.6	3.9	3.9
d) acceptance in the community	3.8	3.9	3.7	4.1	4.0	4.0	3.8	4.0
e) effects on profitability	3.3	3.3	3.5	3.6	4.0	3.2	3.5	3.4
6. Disc or Cultivate								
a) change in crop yield	3.0	3.3	4.0	3.3	2.0	3.0	3.0	3.3
b) change in soil erosion control	3.0	3.8	2.5	3.3	4.0	4.0	3.0	3.6
c) fits into farm management system	4.2	4.0	3.5	4.1	5.0	3.5	4.1	4.0
d) acceptance in the community	3.2	3.8	3.0	3.3	4.0	4.0	3.3	3.6
e) effects on profitability	3.0	3.9	-	3.5	4.0	3.0	3.2	3.6
7. No-till								
a) change in crop yield	3.5	2.6	3.0	3.0	3.0	2.0	3.1	2.8
b) change in soil erosion control	3.9	4.6	4.6	4.6	4.4	4.3	4.3	4.5
c) fits into farm management system	3.0	3.7	4.1	3.6	4.0	3.3	3.7	3.6
d) acceptance in the community	3.0	2.1	3.6	2.1	3.3	4.0	3.3	2.7
e) effects on profitability	3.8	3.0	3.6	3.7	3.6	4.0	3.7	3.5
8. No Fall Tillage								
a) change in crop yield	3.3	3.1	3.3	2.8	3.0	2.3	3.2	2.8
b) change in soil erosion control	4.0	4.4	4.5	5.0	4.3	4.7	4.3	4.6
c) fits into farm management system	4.0	3.4	4.5	4.2	4.3	3.8	4.3	3.7
d) acceptance in the community	3.3	2.9	3.3	4.4	3.8	-	3.5	3.6
e) effects on profitability	3.5	3.4	4.0	3.5	3.3	2.4	3.6	3.2
9. Buffer Strip								
a) change in crop yield	-	2.9	3.0	3.0	3.0	3.7	3.0	3.1
b) change in soil erosion control	3.0	4.3	4.8	4.7	4.5	4.5	4.6	4.5
c) fits into farm management system	4.0	3.9	4.3	4.4	3.7	4.3	4.1	4.2
d) acceptance in the community	3.0	2.7	3.4	4.4	4.5	4.0	3.6	3.6
e) effects on profitability	3.0	3.5	3.8	3.2	3.7	3.5	3.7	3.4

Table 14. Cooperator Impressions of Practices Implemented - cont'd

PERCEPTION	ESSEX Mean*		KETTLE Mean		PITTOCK Mean		TOTAL Mean	
	1992	1991	1992	1991	1992	1991	1992	1991
10. Grassed Waterway								
a) change in crop yield	-	3.5	3.3	3.1	3.0	2.0	3.2	3.1
b) change in soil erosion control	3.0	4.7	4.8	4.7	4.5	4.0	4.5	4.6
c) fits into farm management system	4.0	4.7	4.6	4.2	3.5	3.0	4.3	4.2
d) acceptance in the community	3.0	3.3	4.8	4.4	3.0	-	4.3	4.2
e) effects on profitability	3.0	4.0	3.8	3.5	3.0	3.0	3.6	3.5
11. Berms								
a) change in crop yield	-	4.5	4.3	3.4	3.0	5.0	4.0	3.9
b) change in soil erosion control	-	5.0	5.0	4.8	5.0	5.0	5.0	4.9
c) fits into farm management system	-	5.0	4.0	4.0	3.0	4.3	3.8	4.3
d) acceptance in the community	-	4.5	4.0	4.0	-	3.0	4.0	4.0
e) effects on profitability	-	5.0	4.0	4.3	-	3.7	4.0	4.2
12. Rock Chutes								
a) change in crop yield	-	3.7	3.0	4.0	3.0	-	3.0	3.8
b) change in soil erosion control	-	4.9	4.3	5.0	5.0	-	4.4	4.9
c) fits into farm management system	-	4.3	4.0	4.0	3.0	-	4.2	4.2
d) acceptance in the community	-	4.0	4.3	4.0	-	-	4.4	4.0
e) effects on profitability	-	3.8	3.7	4.5	-	-	3.7	4.0

- With one exception (Essex cooperators working with the modified/adjusted moldboard plow), cooperators in all three test basins working with tillage and planting practices (practices #4 to #9) reported a more positive or constant outlook on "effects on profitability" compared with "change in crop yield" in both 1991 and 1992. This may bode well for higher rates of adoption in the future as cooperators appear to be acknowledging the net financial benefits of implementation of even the newer practices such as no-till.

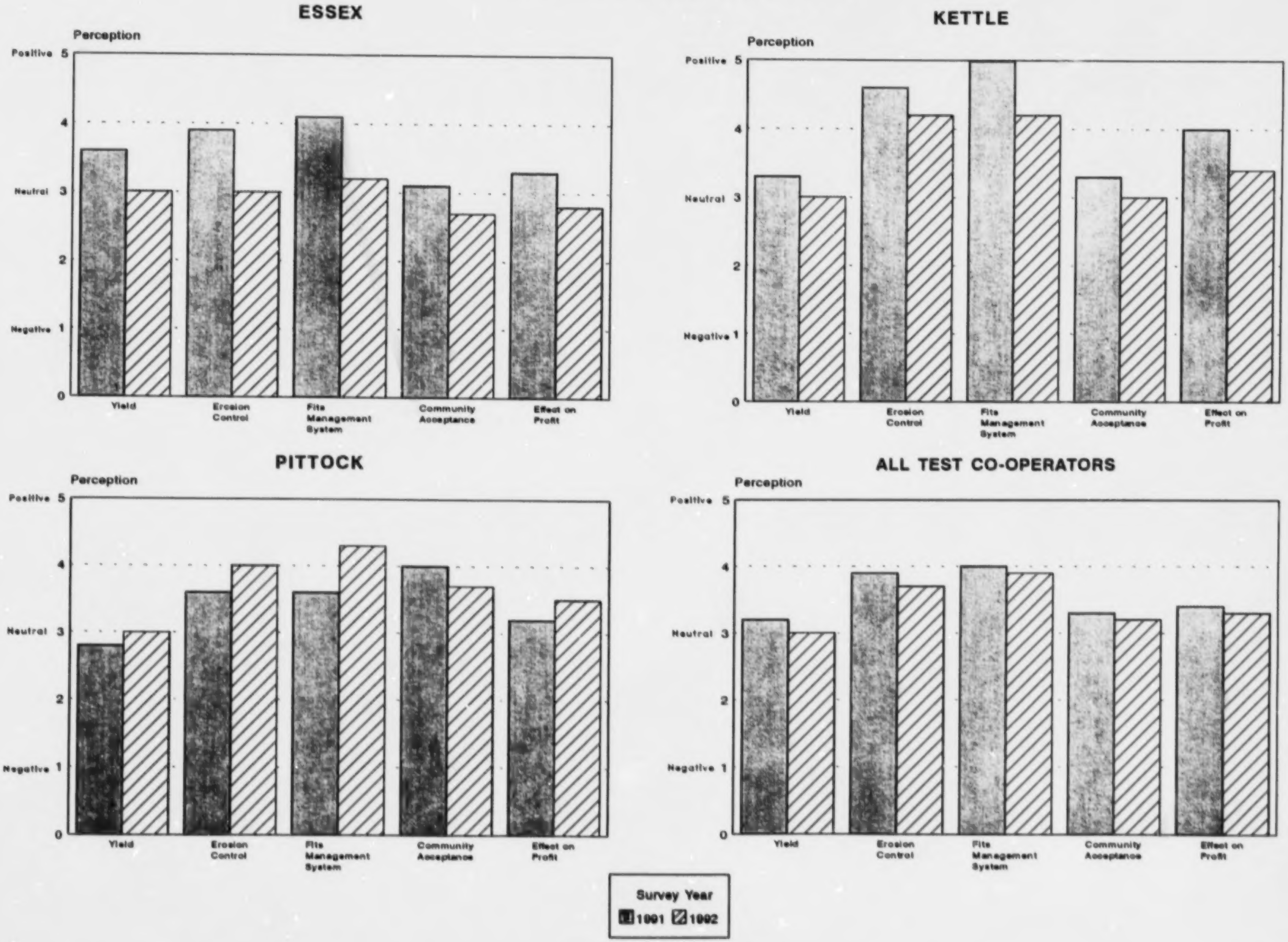
- Cooperators have a high regard for the effectiveness of the conservation practices they implemented in limiting soil loss. Most of the averages for "change in soil erosion control" approach 4.0 or higher. Exceptions to this include the 1992 perceptions in Essex about the modified/adjusted moldboard and chisel plow, the "disc or cultivate" practice in Essex and Kettle, and the buffer strips and grassed waterways in Essex.

Figure 5 illustrates the attitude change calculated in Table 14 toward the modified/adjusted moldboard plow which occurred in the three test sub-watersheds between 1991 and 1992 (which reflect the 1990 and 1991 cropping season experiences respectively). At the outset of the PWS, the modified/adjusted moldboard plow was offered as a conservation alternative because the majority of the cooperators were already using the moldboard plow as a primary tillage tool. Its modification results in slightly higher surface residue levels.

In both Essex and Kettle, positive impressions of the modified/adjusted moldboard plow moved towards neutral or into the negative range for each of the attributes measured in both 1991 and 1992. In Pittock, the reverse occurred; there was a somewhat more positive perspective of each of the plow effects, except for "community acceptance". When responses from all sub-watersheds are combined, a slight decrease in the positive value of each of the effects for the modified moldboard plow is evident. This may reflect a growing awareness that while the adjusted or modified moldboard plow may be used as a first step in adopting conservation practices, its ultimate effectiveness as a soil conservation tool is limited.

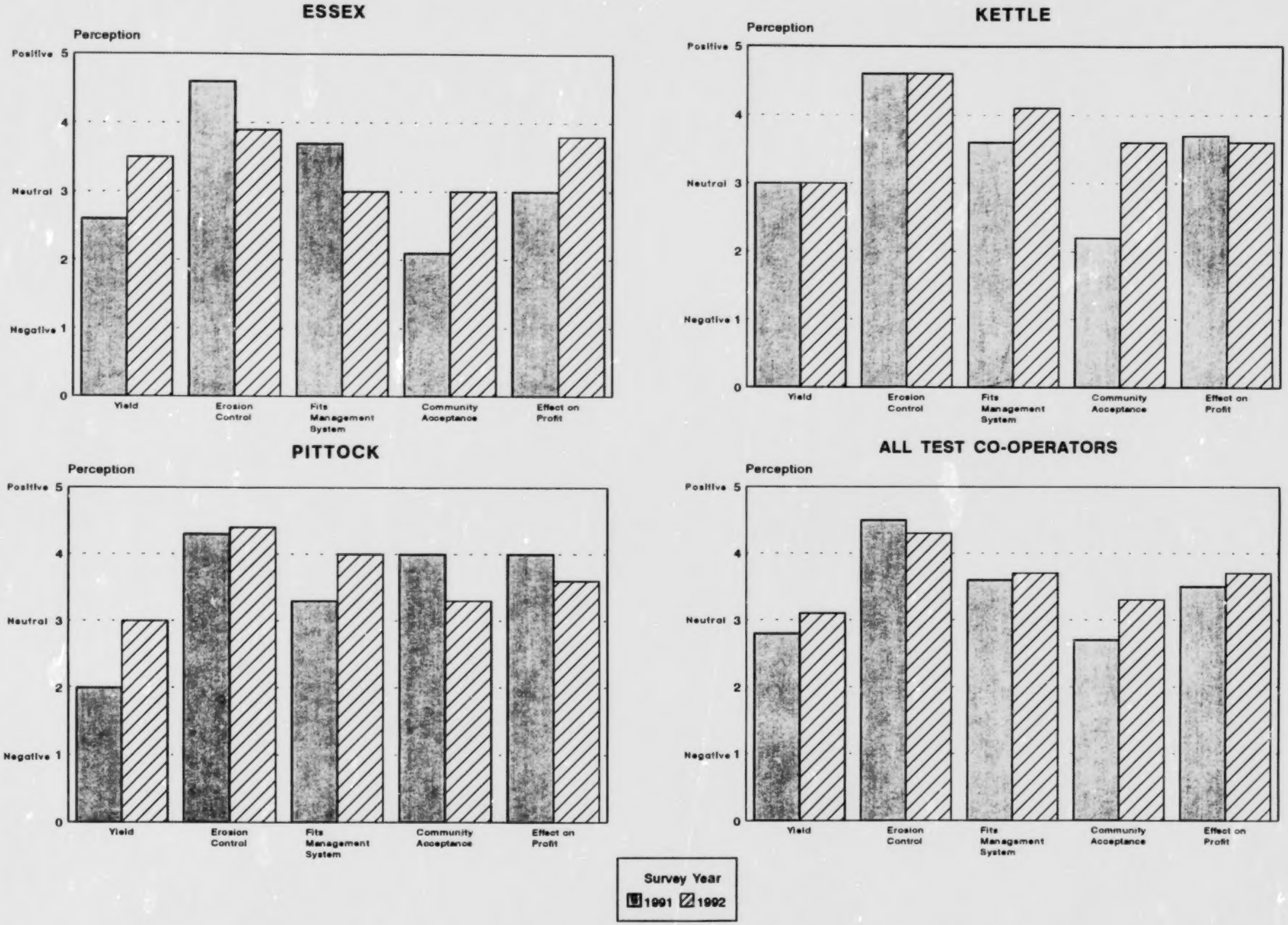
With regard to cooperator perspectives on no-till, Kettle registers the most consistently positive responses between 1991 and 1992. In both the Essex and Kettle sub-watersheds (Figure 6), there is a substantially more positive view of the community's acceptance of no-till in 1992 than in 1991. Conversely, Pittock respondents' view of community

Figure 5 : Co-operator Impressions of Practice Effectiveness Over Time
Modified Moldboard Plow



Source: Co-operator Surveys 1991 and 1992

Figure 6 : Co-operator Impressions of Practice Effectiveness Over Time
No-Till



Source: Co-operator Surveys 1991 and 1992 acceptance was lower in 1992 than in 1991. However, it was more positive in 1991 than in Essex and Kettle. It was observed that Pittock cooperators, during both the 1991 and 1992 interviews, were hesitant to acknowledge that the question of "community acceptance" had any relevance to conservation practiced decision-making, as they perceived decision-making to be an individual matter. Thus, in 1992, each of the sub-watersheds viewed no-till neutrally or somewhat positively with respect to community acceptance. When responses from each of the sub-watersheds are grouped, a slight positive increase in each of no-till's effects is realized with the exception of "erosion control" which was high to begin with in 1991.

4.5 Merits of a Community-Based Approach to Conservation

The PWS was targeted at a relatively few farmers living in close proximity in small watersheds. Opportunity was provided for cooperators to formally and informally share ideas. It was felt that peer support should help to speed the rate of conservation adoption in the test sub-watersheds.

It is difficult to assess the merits of this approach relative to others since a true control could not be included in the PWS experimental design (i.e., an area completely outside the influence of the PWS). However, some observations can be made from the data collected in the 1992 Cooperator Survey, the results of which are noted in Table 15.

Cooperators were asked to identify the frequency of contact they have with fellow cooperators. The average responses for all test and control sub-watersheds lie between "monthly" and "four times/year", with seemingly little difference between test and control in any one watershed. However, when asked whether the PWS has served to increase this level of contact, the mean of each of the test sub-watershed responses is closer to "increase" compared with the control sub-watershed. This difference is particularly noteworthy for the Kettle sub-watersheds where a greater degree of interaction among test cooperators appears to be consistent with contact reports from the field office.

On average, test cooperators reported attendance at non-PWS soil conservation meetings more than control cooperators. Test cooperators appear to have had their appetites whetted for technical and financial assistance as a result of the PWS and are also willing to go elsewhere for information. In all cases, the strength of the PWS influence relative to other

Table 15. Indicators Relating to the Merits of a Community-Based Approach - 1992 Survey (Mean Values)[1]

	Essex Control	Essex Test	Kettle Control	Kettle Test	Pittock Control	Pittock Test	All Control	All Test
1. Frequency of contact with fellow cooperators	4.0	3.9	3.0	3.6	3.5	4.0	3.6	3.8
2. Change in frequency of contact resulting from PWS	1.9	1.5	2.0	1.3	2.0	1.7	2.0	1.5
3. Attendance at non-PWS conservation meetings	1.5	1.8	1.4	1.8	1.2	1.5	1.3	1.7
4. Strength of PWS influence relative to other conservation programs	1.9	1.8	2.6	1.4	2.7	1.9	2.4	1.7
5. Extent to which community farmers are supportive of soil and water conservation efforts	2.8	2.8	3.2	2.8	3.0	3.1	3.0	2.9
6. Perception of community's recent experience with conservation	3.9	4.0	3.6	3.9	3.9	4.1	3.8	4.0
7. Importance of other cooperators as source of conservation information post-PWS	4.0	3.5	4.0	3.7	3.0	3.1	3.5	3.4

[1] Mean values are based on the following scales:

Response to #1 - 1=never, 2=once/year, 3=four times/year, 4=monthly, 5=weekly, 6=daily
Response to #2 - 1=increased contact, 2=remained about the same, 3=decreased
Response to #3 - 1=No, 2=Yes
Response to #4 - 1=strong influence, 2=moderate influence, 3=little influence, 4=no influence at all
Response to #5 - 1=not at all supportive, 2=slightly supportive, 3=somewhat supportive, 4=very supportive
Response to #6 - 1=community has little or no experience, 2=very negative, 3=somewhat negative, 4=somewhat positive, 5=very positive
Response to #7 - scale ranged from 1=not at all important to 5=very important

programs was deemed stronger in the test relative to the control sub-watersheds, which is not surprising given the resources available to the test cooperators. Kettle test cooperators indicated the strongest influence of the PWS relative to other programs.

Cooperators were asked to indicate the extent to which farmers in the community are supportive of soil and water conservation efforts. Little difference can be noted between control and test cooperator responses which indicate that farmers are somewhat supportive. They also concur that the community's recent experience with conservation practices is somewhat positive, with test cooperators in each sub-watershed being slightly more optimistic about this than control cooperators.

Respondents were also asked to identify the importance of "cooperators within project boundaries" as a source of information post-PWS. On average, cooperators felt that other cooperators would be on the "very important" end of the scale as information sources. Control cooperators in Essex and Kettle saw them as even more important than the test cooperators. This bodes well for information dissemination into the control sub-watershed from the test sub-watershed.

4.6 Extent of Cooperator "Ownership" of the Problem and its Resolution

The question of "ownership" of the soil erosion problem and its alleviation is important to address if long-term impacts of the PWS are to be understood. Without being able to specifically quantify the influence of a PWS relative to other conservation initiatives in the same time frame, there are indications that the PWS has encouraged cooperators to own the problem. The extent to which cooperators felt there was a problem in the first place was addressed in Section 4.1.

Cooperators were asked in both the 1988 and 1992 surveys to identify the extent to which soil and water quality information affects farm management decision-making. With the exception of the Kettle control sub-watershed, cooperators gave more consideration to conservation in 1992 than they did in 1988 (Table 16). A t-test analysis of the means between years shows a significant increase in the extent of consideration between survey years for the Pittock control sub-watershed, the grouping of all test sub-watersheds and the group of all cooperators (test and control) at the 95 percent confidence interval. In addition,

Table 16. Extent to Which Information About Soil and Water Quality Affects Farm Management Decisions (Means)[1]

SUB-WATERSHED		1988 SURVEY[2]	1992 SURVEY[2]
Essex	Control	2.2 (n=6)	2.7 (n=6)
	Test	2.9 (n=10)	3.3 (n=10)
Kettle	Control	3.3 (n=4)	2.5 (n=4)
	Test	2.8 (n=9)	3.6 (n=9)
Pittock	Control[3]	2.1 (n=9)	2.7 (n=9)
	Test	2.6 (n=9)	2.9 (n=9)
All	Controls	2.4 (n=19)	2.6 (n=19)
	Tests[3]	2.8 (n=28)	3.3 (n=28)
All Cooperators[3] (test and control)		2.6 (n=47)	3.0 (n=47)

[1] Mean values are based on the following scale of influence:
1=not at all, 2=slightly, 3=somewhat, 4=a great deal.

[2] Only those cooperators answering this question in both the 1988 and 1992 surveys were included in this analysis.

[3] 2-tailed t-test indicates significant differences of the survey year means at the 95 percent confidence interval.

test cooperators in each of the watersheds in 1992 more strongly indicated that information affects their decision-making than did the control cooperators.

There is more evidence suggesting that test cooperators have a high regard for conservation practices in Table 14. For all conservation practices, cooperators indicated primarily positive impressions of the way the practices "fit into the farm management system". In addition, with almost every practice, cooperators indicated a positive outlook on "effects on profitability", which would indicate that cooperators are willing to look at the net returns rather than strictly maximizing yield. These attitudes may reflect the care that was taken in the farm planning process to ensure the "best fit" between conservation practices and existing management systems.

Cooperators in the test and control sub-watersheds were asked about which practices they would increase, maintain or decrease acreage after PWS termination. Results are noted in Tables 17 to 20; main findings are as follows.

Essex

- over 60 percent of the test and control cooperators plan to continue growing winter cover crops as crops, and underseeding cereals to clover/alfalfa;
- the modified moldboard plow and disc/cultivate are the tillage practices most likely to decrease in acreage; in both control and test areas, a high proportion of cooperators indicated plans to increase or have the same acreage under chisel plow, no-till or no fall tillage (test);
- some interest in increasing the number of land management/structures such as buffer strips and tile outlet protection (interest was possibly raised through the Permanent Cover Program of the federal government).

Kettle

- continued and increased use of cropping systems practices, although some test cooperators are moving away from underseeding;
- some cooperators are moving from modified moldboard plow, chisel plow and disc/cultivate to higher residues under no-till and no fall tillage;
- considerable interest in increasing the number of structures.

Table 17. Post-PWS Conservation Intentions - Essex

CONSERVATION PRACTICE	INTENTION (NO. OF RESPONDENTS)											
	Increase Acreage		Same Acreage		Decrease Acreage		Won't Continue		Don't Know		Total Respondents	
	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
A. Cropping Systems												
1. winter cover crop grown for crop	1	1	5	8	-	-	-	1	2	3	8	13
2. winter cover tilled in spring	1	1	2	2	-	-	1	1	4	9	8	13
3. cereal underseeded to red clover/alfalfa	2	-	5	8	-	1	-	-	1	4	8	13
B. Tillage and Planting Practices												
1. modified/adjusted moldboard plow	-	-	2	2	3	3	1	3	2	5	8	13
2. disc/coulter chisel plow	3	3	2	3	1	1	-	2	2	4	8	13
3. disc or cultivate	1	3	5	4	1	4	-	-	1	2	8	13
4. no-till	4	6	-	4	-	-	-	1	4	2	8	13
5. no fall tillage	2	5	1	4	1	-	1	1	3	3	8	13

	Increase Number		Same Number		Decrease Number		Don't Know/No Response		Total Respondents	
C. Land Management	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
1. buffer strip	2	4	1	5	1	-	4	4	8	13
2. grassed waterways	2	2	1	4	1	-	4	7	8	13
3. berms	2	2	1	4	1	-	4	7	8	13
4. tile outlet protection	3	5	1	7	1	-	3	1	8	13

Table 18. Post-PWS Conservation Intentions - Kettle

CONSERVATION PRACTICE	INTENTION (NO. OF RESPONDENTS)											
	Increase Acreage		Same Acreage		Decrease Acreage		Won't Continue		Don't Know		Total Respondents	
	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
A. Cropping Systems												
1. winter cover crop grown for crop	1	3	3	7	-	-	-	-	1	2	5	12
2. winter cover tilled in spring	2	3	-	2	1	-	-	1	1	6	5	12
3. cereal underseeded to red clover/alfalfa	-	2	3	5	-	3	-	1	2	1	5	12
B. Tillage and Planting Practices												
1. modified/adjusted moldboard plow	-	-	2	2	-	6	-	1	3	3	5	12
2. disc/coulter chisel plow	-	3	3	4	-	3	-	-	2	2	5	12
3. disc or cultivate	-	-	4	4	1	4	-	-	-	4	5	12
4. no-till	1	9	1	3	-	-	-	-	3	-	5	12
5. no fall tillage	1	5	1	3	-	2	-	-	3	2	5	12

	Increase Number		Same Number		Decrease Number		Don't Know/No Response		Total Respondents	
C. Land Management	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
1. buffer strip	1	3	2	5	-	-	2	4	5	12
2. grassed waterways	2	4	2	5	-	-	1	3	5	12
3. berms	1	2	-	3	-	-	4	7	5	12
4. tile outlet protection	2	4	1	3	-	-	2	5	5	12

Table 19. Post-PWS Conservation Intentions - Pittock

CONSERVATION PRACTICE	INTENTION (NO. OF RESPONDENTS)											
	Increase Acreage		Same Acreage		Decrease Acreage		Won't Continue		Don't Know		Total Respondents	
	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
A. Cropping Systems												
1. winter cover crop grown for crop	1	3	7	4	-	-	-	-	3	3	11	10
2. winter cover tilled in spring	2	1	5	4	-	-	-	1	4	4	11	10
3. cereal underseeded to red clover/alfalfa	1	2	5	6	-	-	-	1	5	1	11	10
B. Tillage and Planting Practices												
1. modified/adjusted moldboard plow	-	3	3	3	-	-	2	3	6	1	11	10
2. disc/coulter chisel plow	-	1	4	6	1	-	2	1	4	2	11	10
3. disc or cultivate	1	1	6	4	-	2	-	1	4	2	11	10
4. no-till	-	3	3	1	-	-	2	1	6	5	11	10
5. no fall tillage	1	2	4	5	1	-	1	-	4	3	11	10

	Increase Number		Same Number		Decrease Number		Don't Know/No Response		Total Respondents	
C. Land Management	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
1. buffer strip	2	-	3	7	-	-	6	3	11	10
2. grassed waterways	2	1	4	4	-	-	5	5	11	10
3. berms	1	1	2	4	-	-	8	5	11	10
4. tile outlet protection	-	-	4	6	-	-	7	4	11	10

Table 20. **Post-PWS Conservation Intentions - All Control and All Test Sub-Watersheds**

CONSERVATION PRACTICE	INTENTION (NO. OF RESPONDENTS)											
	Increase Acreage		Same Acreage		Decrease Acreage		Won't Continue		Don't Know		Total Respondents	
	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test	Con	Test
A. Cropping Systems												
1. winter cover crop grown for crop	3	7	15	19	-	-	-	1	6	8	24	35
2. winter cover tilled in spring	5	5	7	8	1	-	1	3	10	19	24	35
3. cereal underseeded to red clover/alfalfa	3	4	13	19	-	4	-	2	8	6	24	35
B. Tillage and Planting Practices												
1. modified/adjusted moldboard plow	-	3	7	7	3	9	3	7	11	9	24	35
2. disc/coulter chisel plow	3	7	9	13	2	4	2	3	8	8	24	35
3. disc or cultivate	2	4	15	12	2	10	-	1	5	8	24	35
4. no-till	5	18	4	8	-	-	2	2	13	7	24	35
5. no fall tillage	4	12	5	12	2	2	3	1	10	8	24	35
	Increase Number		Same Number		Decrease Number		Don't Know/No Response				Total Respondents	
C. Land Management	Con	Test	Con	Test	Con	Test	Con		Test		Con	Test
1. buffer strip	5	7	6	17	1	-	12		11		24	35
2. grassed waterways	6	7	7	13	1	-	10		15		24	35
3. berms	4	5	3	11	1	-	16		19		24	35
4. tile outlet protection	5	9	6	16	1	-	12		10		24	35

Pittock

- continued reliance on cropping system practices for erosion control;
- some continued or increased use of the modified moldboard plow, although some are also dropping it;
- some are continuing or planning to increase no-till acreage, but not as many as in Essex and Kettle;
- fewer land management practices planned relative to other watersheds.

When asked about the kinds of support needed to enable realization of their conservation goals, those most frequently cited include:

- money from better crop prices and through financial assistance programs;
- availability of equipment at low cost; it is too expensive to buy;
- continued technical support.

There is interest in continuing conservation practices, but many feel they require some form of support to continue the transition to alternative practices. Cooperators in Essex and Kettle, in particular, wanted continued support for the no-till planting they want to try in the next year or two.

The equipment use survey conducted in July 1991 (Appendix A-4) provided an opportunity for cooperators to suggest how their future conservation equipment needs could best be met.

Regarding the modified moldboard plow, the majority of respondents looked to modifying their own for meeting future needs. Cooperators anticipated various means for meeting future chisel plow needs; renting from a dealer, purchasing their own, modifying their own and joining a users' group. A few cooperators in each watershed were inclined to purchase their own no-till drill. However, in the Kettle watershed, four cooperators showed interest in joining a users' group, while another three said they might modify their own drill. The most popular option for the no-till planter was modifying an existing planter to no-till. In Essex, the majority of cooperators intended to purchase their own, while a few in Kettle and Pittock considered joining a users' group.

An example of how the problem and associated solutions have been "owned" in Kettle and Essex is the profile that others have given to the conservation efforts of selected farmers in those areas. In Kettle, one producer was awarded the 1992 overall field crop champion and the corn producer awards from the Delaware-Westminster Agricultural Society. In 1992, he had significant acreages of corn, soybean and wheat under no-till. In 1991, the same producer's no-till wheat crop was awarded winter wheat champion by the same Society. Another producer from the same watershed won the 1991 Kettle Creek Conservation Authority Stewardship Award, and currently is a member of the Authority's Board. In Essex, a test cooperator received the 1991 Conservation Farmer Award from the Essex County Soil and Crop Improvement Association for his crop rotation and no-till planting initiatives.

4.7 Cooperator Rating of Their Experience in the PWS and Suggestions for Future Programming

Cooperators were asked to rate their overall experience in the PWS on a scale of 1=very positive; 2=somewhat positive; 3=neither positive or negative; 4=somewhat negative, and; 5=very negative. The findings are as follows:

Sub-Watershed		Mean Value	No. of Respondents
Essex	Control	1.6	8
	Test	1.5	13
Kettle	Control	2.4	5
	Test	1.4	12
Pittock	Control	2.1	11
	Test	2.2	10
Totals	Control	2.0	24
	Test	1.7	35

Overall, cooperators considered their involvement in the PWS to be a positive experience. The most positive ratings were in the Essex sub-watersheds and the Kettle test sub-watershed. The least positive and tending towards neutral comments were expressed by the Pittock cooperators and the Kettle control cooperators.

Cooperators were asked to highlight an incident/experience that they will remember as being particularly positive. Some of the more frequently mentioned experiences:

Essex

- seeing the wind blow and soil not move on my farm while other farms were making the snow black;
- working and talking with other cooperators and project staff; trying no-till and seeing wheat yields surpass those of conventional;
- being able to replant soybeans no-till after crusting lowered seedling survival.

Kettle

- trip to Illinois conservation and research farms was the "best agricultural trip I've participated in";
- "harvesting the no-till soybeans on the project farm in a wet fall, the combine rarely left more than the treadmarks of the tires"; savings of fuel and horsepower;
- planting no-till wheat after soybeans into poor muddy conditions and getting higher than expected yields.

Pittock

- no-till corn and barley yields;
- appreciated access to PWS equipment (control cooperator);
- technical input from D. Lobb and technicians.

Similarly, cooperators were asked to highlight a particularly negative experience. These include:

Essex

- not being able to get timely technical service help from the Great Plains dealer (no-till drill);
- cut off moldboards did not meet expectations;
- insufficient financial support or guarantees when testing new systems and practices.

Kettle

- no-till beans planted into wheat stubble; soil was too heavy and wet, and slug infestation forced planting of field three times;
- trying to no-till corn into wheat stubble underseeded with red clover (too wet and clover should be killed in the fall);
- trying to put nitrogen on corn with a strange machine and limited time use.

Pittock

- record books;
- not being allowed to use equipment outside the watershed when no one else was using it;
- hopes government will not use water quality against farmers and cause farmers to lose more money;
- one operator of a large cash crop farm growing dried/coloured beans feels there is no way to do conservation tillage on coloured bean land without risking quality and yield.

Cooperators were invited to give their management suggestions should such a program ever be considered elsewhere in Ontario. The main suggestions recorded are as follows:

- fully explain what project aims are; always be ready to hear a farmer out as he speaks from practical experience;
- use the same approach - low key, non-threatening, no high pressure (offer alternatives, let them choose), let the group set the agenda;
- encourage better cooperation between cooperators in use of equipment;

- when you start, take the prospective people on tours to see firsthand how other people are implementing the practice to be considered;
- go slow at first like you did, so farmers can "walk before they run";
- keep cooperators up to date with regular seminars and farm tours;
- choose a more erodible terrain to demonstrate more impact by the project (Pittock cooperator);
- consider getting farmers more involved with checking rainfall, soil erosion and other tests on a one-to-one basis;
- give more information up-front on what the end results might be;
- watch out for big, mixed enterprise operations as they won't have time or the daily flexibility to incorporate project requirements into their operations;
- promote more small trials on each farm;
- satisfied with management; you definitely need someone based in the trailer (locally) who understands farmers and their needs;
- state the monetary benefits of the program up-front.

On average, cooperators in all watersheds felt that it would have been slightly to somewhat helpful to have a cooperator-run watershed committee to resolve issues as they arose; 6 of 35 (17%) test cooperators and 2 of 24 (8%) of control cooperators felt it would have been very helpful to have such a committee.

Test cooperators were asked to specify a preferred length of time for such a project in order to develop confidence in the practice they were trying. Almost without exception, cooperators specified a time frame between 5 to 10 years. Several mentioned three years was too short given the extremes in weather. Two cooperators in Kettle felt 3 years for no-till wheat was adequate, but 5 to 7 years for no-till corn and soybean fine-tuning was required. Another suggested a 6-year program would be about right so the entire rotation (all land on-farm) could be tried under conservation practices.

Control cooperators were asked to identify any ways in which they may have felt disadvantaged by the PWS. Four of 24 control cooperators noted they did feel disadvantaged for the following reasons:

- distance to farm land located outside the sub-watershed boundaries was too great to expect the PWS to make equipment available;

- where half the field was in the test and half in the control watershed, it felt like I was receiving only partial compensation;
- we were on our own, whereas the test cooperators received financial compensation.

Cooperators were invited to provide concluding comments on the PWS. The main ones offered follow:

- Thank you for the opportunities this has provided for me to test some of the conservation practices that I would otherwise never have tried. This will be the way I farm from now on.

- I feel sometimes this project has been a waste of tax money because during these 3 years we received no data that phosphate levels have decreased in the Lake Erie basin. I personally believe biological life and earthworms, restoration of needed enzymes, co-enzymes, etc. should be studied more to build humus. Also, the benefits of green manure crops should be better understood, so we need not rely on traditional chemical/fertilizer programs that can harm soil life. This kind of research would be better for farmers and society for years to come.

- I feel the information you gathered and gave us was well done. I noticed your technician gathering data in terrible weather conditions, always putting forward a top effort. I wish the program would be extended.

- I feel the watershed project has, for the most part, provided a closer "family" spirit among cooperators. They have been willing to interact and share feelings and experiences (positive and negative) about the project.

- Would like to see published paper reviewing actual levels of sediment load/phosphorus in watershed. I am also trying to cut back pesticide use by band spraying. I feel that this is a very important step which is not recognized by SWEEP. I have cut back herbicide use by 60 to 70 percent on corn and have planted red clover cover crop into corn for 5 years.

- I thought it was an excellent way to learn no-till cropping practices and at the same time do some good for the land and streams.

- Never again. (mentioned by a large farm operator who felt his dried bean cropping system was unsuited to alternative tillage practices).

- The returns to farming are low; no one is interested in anything but surviving.

- Sorry, I didn't have enough time to get as deeply involved as I would have liked to. I think with conservation practices now being talked about and used more widely, this program could be extended or at least the equipment could be made available.

- I felt the length of project was too short. As a cooperator, more time was needed to implement conservation tillage practices that provided significant soil and water quality results from the watershed. Our two watershed technicians have been patient and most helpful in obtaining our goals.

- I will miss the advice, assistance and equipment when the project is over.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This section provides concluding statements with respect to factors influencing attitudinal and behavioural change throughout the PWS. The conclusions are grouped as follows: cooperator perception of the problem and the general merits of soil conservation; factors affecting adoption; perception of practice effectiveness; factors inherent to the PWS itself, and; suggestions for future programming.

5.1 Cooperator Perception of the Soil Erosion Problem/Merits of Soil Conservation

1. Recognition of soil degradation as a problem on cooperator farms appears to be an important prerequisite to obtaining consistent farmer interest and response. In 1988, Kettle test cooperators perceived the greatest occurrence of erosion (Figure 3) and have demonstrated a consistent progression in the adoption of conservation practices (see PWS report - Implementation of Conservation Systems) on land within the sub-watershed. At the time of the selection of watersheds for the PWS, it was recognized that cooperators in the Pittock watershed expressed the least concern about soil erosion of all three watersheds (see PWS report - Study Area Selection, Description and Climate). Subsequently, Pittock cooperators in general appeared more hesitant to adopt conservation technologies (see PWS report - Implementation of Conservation Systems).

2. Implementation of erosion control measures has resulted in test cooperators perceiving slightly less erosion on their farms in 1992 relative to 1988 (Figure 3). Conversely, control cooperators as a group perceive slightly more erosion happening on their farms over the same time period. Control cooperators have likely become sensitized to the erosion problem as a result of the PWS, but have not received the encouragement to implement measures within the watershed boundaries to alleviate the problem.

3. Kettle test cooperators perceive a marked improvement in water quality over the four year time period (Figure 4). Consistent trends in the actual water quality monitoring results

were not realized over the life span of the project (see PWS report - Evaluation of Conservation Systems - Water Quality).

4. There is evidence that cooperators in general, affirm the overall concept of soil and water conservation. In all sub-watersheds, cooperators agree that "conserving soil and water is a good investment for their area" (Table 3). It is important to note, however, that the strongest affirmative responses and the most positive change in responses since 1988 were provided by cooperators in the Essex and Kettle test sub-watersheds. Although still agreeing with the statement in 1992, Pittock test sub-watershed cooperators responded less favourably to the statement than they did in 1988. This may reflect the more positive conservation experience realized by cooperators in Kettle and Essex.

   In all three test sub-watersheds in 1992, there was a trend toward disagreement with the statement, "costs to the farmer of soil conservation are greater than the on-farm benefits", relative to how they responded in 1988. This suggests that positive experiences shaped their thinking over the four years, to the point where net returns/farm profitability for virtually all conservation practices are viewed positively (see also conclusion #2, Section 5.3).

5.2 Factors Affecting Adoption

1. Cooperators' reasoning for choice of conservation practice varies by watershed and over time. In Kettle, where soil erosion was most obvious and where the expressed need for erosion control was the greatest, there remains a continuing desire to do what's right for the land resource (biophysical reasons). Having installed structures, Kettle cooperators have demonstrated a growing appreciation for the positive economic benefits of no-till in particular, in order to complement the work of the structures. Essex cooperators have shifted away from biophysical reasoning to a focus on economic and farm management concerns over the life of the PWS. Conversely, Pittock cooperators, who initially indicated soil erosion was not a problem, have most recently expressed biophysical reasons for using conservation tillage and planting practices. In Pittock, there appears to be a growing appreciation of benefits to the land resource, but less consideration of economics as a motivating force.

2. Motivation for practice implementation requires initial practices with which farmers are most familiar and most easily incorporated into farming systems. In both Kettle and Essex, initial discussions and experimentation centered around modifications to the moldboard plow. Practice introduction time is reduced by building on practices farmers are familiar with, and by being ready to suggest or respond to requests for technical guidance on the more complicated conservation practices as they arise.

   Initial emphasis on structures on long slopes in Kettle seemed an appropriate starting point for conservation discussions. After the structures were installed, several cooperators noted sediment build-ups in the ponded areas behind the berms. This prompted serious consideration of no-till practices to minimize soil movement off the fields.

3. The time required for practice adoption appears to remain a highly variable and individually-oriented factor. Specific farmer and farm firm characteristics or circumstances from the PWS which have affected adoption rates include the following:

   - farm enterprises with livestock manures needing incorporation or with certain specialty cash crops (e.g. white/coloured beans) have been most hesitant to consider conservation cropping systems that include no-till;

   - very large, diversified farm enterprises with tight crop planting and harvesting schedules have not wanted to "bother" with scheduling the use of PWS equipment and time to keep field records;

   - cooperators who enjoy modifying and fine-tuning management systems tend to be more patient in working with the more complicated alternative tillage and cropping practices;

   - timing of technician input has been important; technicians have supported no-till drilling of wheat, for example, under moist field conditions where conventional tillage was impossible, or for replanting poorly germinated soybeans; conversely, no-tilling soybeans or corn into spring-killed clover proved to have adverse crop yield impacts; integration of alternative tillage practices with structural control measures has been a goal in the overall farm planning process;

- access to the PWS equipment has been a crucial component in encouraging practice adoption; many cooperators felt they did not have the acreage to support the purchase of a conservation drill or planter, yet they wish to continue with these practices post-PWS;

- farm tours in Ontario and beyond have served to stimulate and reinforce adoption behaviour; several cooperators also mentioned the March 1992 Innovative Farmers Workshops (London) as positively influencing their decision-making;

- in general, cooperators agree that five to ten years is a realistic time frame to achieve a satisfactory comfort level with conservation planter equipment; this takes into consideration extremes in weather, shifting weed populations, fine-tuning equipment to variable soil textures and moisture conditions, and the application of conservation planting to all crops in the rotation; for example, advice was sought in the spring of 1992 from PWS specialists on trashwhipper setup and no-tilling row crops into heavy wheat residue; some suggested a three year time frame may be adequate for developing confidence in no-till wheat production.

5.3 Perception of Practice Effectiveness

1. Test cooperators have a high regard for the effectiveness of the conservation practices they have implemented, in limiting soil loss. For those who perceive they have a problem, this can serve as a strong motivating force.

2. Test cooperators are generally neutral or slightly positive about practice effects on crop yields. They are almost always more positive with respect to "effects on profitability". This bodes well for future adoption as cooperators appear to be acknowledging the net financial benefits of implementation of even the less familiar practices.

3. Test cooperators in Essex and Kettle have a substantially more positive view of the community acceptance of no-till practices in 1992 relative to 1991. Peer support can contribute to higher adoption rates.

5.4 Factors Inherent to the PWS

1. Several cooperators, particularly in Pittock, raised the issue of their own lack of understanding of project design and goals from the outset. It is possible that cooperators who missed one or more of the early orientation meetings were not personally updated on meeting content and therefore developed certain misconceptions about the project (eg. water quality monitoring results to be potentially used against them).

2. The PWS did not provide for designation of a cooperator spokesperson or a small committee to whom project participants could take their concerns and suggestions. This could have served a purpose in providing a "safe place" for cooperators to negotiate disputes and provide a sense of continuity when changes in technical staff occurred.

3. Some interest was expressed in both Essex and Pittock in lowering herbicide use and promoting ecological agriculture. Specifically, band spraying combined with inter-row cultivation was mentioned as a technique that the PWS could not provide equipment for, or had few technical or financial resources to support these ideas.

4. Few resources were allocated to dissemination of PWS experience beyond the boundaries of the watersheds. Wider community support for, and understanding of conservation initiatives may have been engendered by such promotion. Fortunately, some local organizations have given profile (conservation/production awards) to selected conservation farmers whose experience has been built through the PWS.

5.5 Cooperator Perspectives on Post-PWS Conservation Intentions and Future Programming

1. There appears to be interest in maintaining or increasing acreage of crops under selected conservation practices in each of the watersheds. The focus will likely be on no-till in Kettle and Essex, along with some increase in cropping systems practices (e.g. winter cover crop grown for crop or tilled in spring). Fewer in the Pittock watershed are choosing to expand no-till practices; rather, there appears to be a reliance on cropping systems practices.

2. The most frequently cited kinds of support to enable continuation of cooperator conservation goals post-PWS include:
   - money from better crop prices and through financial assistance programs;
   - availability of equipment at low cost, as it is too expensive to buy;
   - continued technical support.

3. In future programming, cooperators suggested the following approaches:
   - a low key, non-threatening approach where the farmers help set the agenda;
   - take prospective cooperators on tours to see firsthand how other people are working with the specific techniques, and thus provide motivation;
   - keep cooperators up-to-date with project findings along the way;
   - ensure technical support is based in the local community;
   - where possible, involve cooperators in environmental monitoring or other field testing exercises.

Recommendations

Recommendations applicable to other conservation programming initiatives where accelerated adoption rates are sought, are noted below:

1. determine from potential cooperators, that they perceive a soil erosion problem, and that they are willing to try to correct it. Also, ensure that they are presented with current information about the soil conserving attributes and economic benefits of the conservation measures they are being asked to consider to alleviate the problem;

2. whenever cooperators are unable to attend project information sessions particularly at project start-up, contact each cooperator to ensure he gets the same information as everyone else. This will minimize the possibilities of misunderstandings arising related to project intentions and objectives;

3. wherever possible, include peer support mechanisms for promoting newer practices such as no-till. These may include visits to other conservation farms of similar enterprise types where exposure to proven techniques can occur, or participation in technical workshops, seminars or demonstration sites;

4. ensure that adequate technical support is available locally, and that access to equipment at critical cropping phases does not pose a constraint to experimentation with alternative practices;

5. ensure that cooperators have a "safe place" where they feel comfortable taking their project-specific concerns. This may require setting up a cooperator committee as a sounding board where potential disputes can be resolved and where continuity can be maintained should change in technical staff occur;

6. in future programming, use a low-key, non-threatening approach to project design and implementation where farmers help set the agenda. The farm management system and enterprise-specific conservation needs and constraints must be addressed with each cooperator.

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APPENDIX A

CO-OPERATOR SURVEY INSTRUMENTS

A-1.	Baseline Survey Form June 1988
A-2.	On-going Attitude Monitoring Data Sheet
A-3.	Test Co-operator Survey Form January 1991
A-4.	Equipment Use Survey Form July 1991
A-5.	Final Co-operator Survey Form January 1992

A-1. Baseline Survey Form June 1988

SWEEP - PILOT WATERSHED PROJECT

SOCIO-ECONOMIC SURVEY

JUNE, 1988

The main purpose of this survey is to ask your opinions about a variety of topics important to conservation farming. A few questions about your specific farming practices are also included.

The survey is divided into sections including "Attitudes", "Community", "Farm Management Information", "Personal Information", and "Comments on the Project to Date".

By grouping the answers you give with those given by other farm operators in this drainage basin, we will be better able to describe this project area. In addition, we will be able to notice changes in people's opinions and practices over the life-span of the project. These changes will help us to know what to expect if other similar projects were to be tried in other areas of southwestern Ontario.

YOUR NAME: ____

DATE: ______________________________

I - ATTITUDES

A. Soil Erosion/Degradation as a Problem in the Basin

1. PLEASE IDENTIFY THE EXTENT TO WHICH THE SITUATIONS LISTED OCCUR ON LAND YOU FARM WITHIN THE DRAINAGE BASIN. CIRCLE ONE NUMBER FOR EACH SITUATION.

		Extent to Which Situation Exists			
	Type of Situation	Not at all	Some Occurrence	Regular Occurrence	Extensive
A.	Decrease in yields on knolls or water runs in fields	1	2	3	4
B.	Soil washing away from around tile outlets or along ditch/streambanks	1	2	3	4
C.	Evidence of soil compaction in some fields	1	2	3	4
D.	Injury to young plants due to wind erosion or being covered by sediment	1	2	3	4
E.	Eroded soil filling in drainage ditches	1	2	3	4
F.	Seasonal evidence of soil washing (rills or small gullies) on some fields	1	2	3	4
G.	Other (specify) _______________	1	2	3	4

2. Overall, to what extent do you feel soil erosion is occurring today on land you farm within the drainage basin (Circle one)

Not At All	Slight Occurrence	Moderate Occurrence	Serious Occurrence
1	2	3	4

B. Attitudes Affecting Management Decisions

3. A) To what extent does information about soil and water quality affect the decisions you make in your farming operation today? (Circle your response)

Not At All	Slightly	Somewhat	A Great Deal
1	2	3	4

3. B) If you have answered question 3(A) above by circling 2, 3 or 4, please note below, the type and source of information used and the reason for its use:

Type of Information	Source	Reason for Use

C. Attitudes Regarding Broader Environmental and Economic Issues

4. LISTED BELOW ARE SOME STATEMENTS ABOUT THE LOCAL AREA & THE ENVIRONMENT. PLEASE INDICATE IF YOU AGREE OR DISAGREE WITH THEM BY CIRCLING THE APPROPRIATE NUMBER.

A. Water quality in this basin's drain has been improving over the past 5 years (Note: if farming land in both the control and test basins, answer the question for both and indicate which answer is control and which is test.)

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
1	2	3	4	5	0

B. Making an effort to conserve soil and reduce runoff in this area is a good investment.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
1	2	3	4	5	0

C. In general, costs to the farmer of soil conservation are greater than the on-farm benefits.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
1	2	3	4	5	0

D. Society as a whole should pay more of the costs for agricultural pollution control.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
1	2	3	4	5	0

D. Support for Soil and Water Conservation Efforts

5. A. In general, to what extent do you feel farmers in this community are supportive of soil and water conservation efforts? (circle one)

Not at all Supportive	Slightly Supportive	Somewhat Supportive	Very Supportive
1	2	3	4

B. Would you describe this community's past experience with conservation practices as: (choose one)

_______ very positive

_______ somewhat positive

_______ somewhat negative

_______ very negative

_______ community has little or no experience

C. If positive or negative, in what way?

____

____

____

II - COMMUNITY

THE FOLLOWING SET OF QUESTIONS WILL HELP US UNDERSTAND A BIT MORE ABOUT THIS DRAINAGE BASIN IN TERMS OF THE KINDS OF CONTACT FARM OPERATORS HAVE WITH EACH OTHER AND WITH VARIOUS ORGANIZATIONS.

1. In general, how frequently would you say you have contact with any of your neighbours who farm land in the project drainage basin you are in? (check one)

______ daily
______ weekly
______ monthly
______ four times/year
______ once/year
______ never

2. Under what circumstances are these contacts made? (check all that apply)

____ church activities
____ farm business dealings (share equip., labour)
____ community social activities
____ other (specify) ______________________________________
____
____ at agricultural supply centres
____ at farm-related meetings
____ social get togethers in our homes
____ local sports activities

3. A) Are you or any members of your household presently members of any farm or farm-related organizations?

_____ Yes _____ No

B) If yes, could you indicate which ones from the following list? (check all that apply)

______ Soils and Crops Improvement Association
______ Women's Institute
______ 4-H
______ Ontario Federation of Agriculture
______ Christian Farmers Federation of Ontario
______ Marketing Board or Commodity Group Representative
______ Other (please specify) ______________________________
____

4. Have you ever looked for information specifically on how to deal with a soil erosion or other soil management problem on your farm?

______ Yes ______ No

If yes, who or what did you consult? (specify source of information)

____

____

____

5. Within the past year, have you attended any meetings dealing specifically with soil conservation topics? (Do not include any SWEEP meetings regarding the Watershed Program.)

______ Yes ______ No

If yes, who sponsored the meeting(s) you attended?

______ Soil and Crop Improvement Association
______ Ontario Ministry of Agriculture and Food - sponsored event
______ Conservation Authority
______ University of Guelph
______ College of Agricultural Technology
______ Farm Organization
______ Commodity group
______ Other (specify) ______________________________

____

III - FARM MANAGEMENT INFORMATION

THIS SECTION WILL HELP TO SPECIFY THE EXTENT TO WHICH YOU CURRENTLY KEEP RECORDS FOR VARIOUS CROPPING PRACTICES. IN ADDITION, THERE ARE SOME GENERAL QUESTIONS REGARDING THE CHARACTERISTICS OF THE LAND YOU FARM IN THE DRAINAGE BASIN.

1. Please indicate (with a check mark) whether you keep written records of the following information for each field or for each crop.

	Operation	By Field	By Crop	No Records
A)	seeding rates/varieties	______	______	______
B)	fertilizer rates/formulations	______	______	______
C)	herbicide rates/formulations	______	______	______
D)	number of tillage passes	______	______	______
E)	type of tillage pass	______	______	______
F)	fuel use for:			
	- each type of tillage operation	______	______	______
	- other field operations	______	______	______
	(planting, spraying, etc.)	______	______	______
G)	time required for:	______	______	______
	- each type of tillage operation	______	______	______
	- other field operations	______	______	______
	(planting, spraying, etc.)	______	______	______
H)	harvesting - yield measurements	______	______	______
I)	date operations performed	______	______	______

2. Do you go through an annual crop budget calculation for each crop?

______ Yes ______ No ______ Only for some crops

3. Are you participating in OMAF's "Ontario Farm Management Analysis Project"? (Farm records are submitted to County OMAF offices for detailed farm or enterprise analysis.)

______ Yes ______ No

4. A) Do any organizations, agencies or companies run crop trials, research plots or demonstration plots on any of the land you farm in the project areas?

______ Yes ______ No

4. B) If yes, please note the name of the group responsible and the type of work being conducted.

Group Responsible	Type of Work
_____________	_____________
_____________	_____________

5. When crop production problems arise, some farmers have specialists come on-farm to diagnose the problems. Do you have anyone coming to your farm on a regular basis to monitor and diagnose crop production problems? (check all that apply)

_____ nutritional deficiencies
_____ weed problems
_____ disease problems
_____ insect problems
_____ other (please specify) _______________________________
____

BASED ON THE UNDERSTANDING YOU HAVE OF THE LAND YOU FARM IN THE DRAINAGE BASIN, DESCRIBE THE FOLLOWING:

6. A) The main soil texture: (choose one)

_____ coarse (sandy)
_____ medium (loam, silt loam)
_____ fine (clay loam, clay)
_____ other (describe) _______________________________

B) main slope characteristics: (choose one)

_____ flat (0 - 2% slope)
_____ gently rolling (3 - 10% slope)
_____ hilly (11 - 15% slope)
_____ untillable (over 25% slope)

C) main existing drainage characteristics: (choose one)

_____ poor
_____ imperfect
_____ moderately well-drained
_____ well-drained
_____ other (describe) _______________________________

IV - PERSONAL INFORMATION

TO HELP US INTERPRET THE INFORMATION YOU'VE PROVIDED IN THE EARLIER SECTIONS, WE ARE INTERESTED IN OBTAINING THE FOLLOWING INFORMATION. ALL RESPONSES WILL BE HELD IN CONFIDENCE.

1. How many years have you been operating a farm here or elsewhere?

____ 0 - 4
____ 5 - 9
____ 10 - 14
____ 15 - 19
____ 20 - 24
____ 25 - 29
____ 30 or more

2. To which age category do you belong?

____ under 25 years old
____ 25 - 34 years old
____ 35 - 44 years old
____ 45 - 54 years old
____ 55 - 64 years old
____ 65 or older

3. How many years of formal education have you completed? (Check highest level achieved.)

____ elementary school
____ some high school
____ high school (Gr. 12 or 13)

Some College or University:

____ agricultural
____ non-agricultural

College or University degree or diploma:

____ agricultural
____ non-agricultural

4. In which category do your gross farm sales belong? (Consider an average dollar value of the past three years.)

____ under 10,000
____ 10,000 - 24,999
____ 25,000 - 49,999
____ 50,000 - 99,999
____ 100,000 - 250,000
____ over 250,000

5. Which of the following best describes the type of organization for your farm business?

____ sole proprietorship
____ partnership among family members
____ partnership among non-family members
____ a corporation with most of the shares owned by you & family members
____ other (specify) ________________________

6. Would you describe the farm business as a:

____ full-time operation
____ part-time operation
____ hobby farm
____ other (specify) ________________________

7. Please indicate the extent to which you agree or disagree with the following statements. (Circle one number for each statement.)

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
A. I consider my neighbours' opinions when I make decisions regarding new farm practices.	1	2	3	4	5
B. I am reluctant to accept new farm practices until I see them working for people around me.	1	2	3	4	5
C. Of my neighbours, I would be among the first few to try a new farming practice.	1	2	3	4	5
D. I feel a moral obligation to prevent soil loss due to erosion	1	2	3	4	5

V - COMMENTS ON THE PROJECT TO DATE

Working with all or most of the farm operators in small drainage basins is a new approach to addressing soil and water conservation needs in Ontario. Because of this new approach, we are interested in hearing your comments about how things have been handled so far in getting this program off the ground.

Please comment on:

1. main strengths

2. main shortcomings

3. suggestions for improvement

A-2. Ongoing Attitude Monitoring Data Sheet

CONSERVATION PRACTICES - COOPERATOR PERCEPTIONS/ATTITUDES

Cooperator Name: ______________________

Date: ______________________

Conservation Practice/Technology/Adaptation/Structure discussed:

____

1. Reasons why cooperator ready/not ready to try or use practice (provide specific details where possible).

Ready	Not Ready	Factor	Reasoning
		A) Biophysical	
___	___	i) landbase (soil, topography, etc.)	___
___	___	ii) other ___	___
		B) Economics	
___	___	i) return on investment	___
___	___	ii) yield effects	___
___	___	iii) inputs - time, labour, fuel chemicals, wear and tear, etc.	___
	___	iv) financial lender or farm owner/ manager disapproves	___
___	___	v) other ___	___
		C) Farm Management	
___	___	i) fit with current cropping practices/systems	___
___	___	ii) fit with current machinery complements	___
	___	iii) general feeling that it's too much bother/hassle to try	___
___	___	iv) other ___	___
		D) Technology	
	___	i) feeling that technology is unproven for farm specific conditions	___
___	___	ii) other ___	___
		E) Personal Attitudes	
	___	i) general feeling that it's too risky to try	___
	___	ii) not enough of an erosion/ degradation problem to try it	___
	___	iii) knows someone else who tried it and had problems (note who and where)	___
___		iv) need to stop a particular problem	___
		v) seen it work for someone else (who and where)	___
___		vi) will do it for ethical/ stewardship reasons	___
___	___	vii) other ___	___

Ready	Not Ready	Factor	Reasoning
		F) Community	
	___	i) idea is unacceptable in this area/ cummunity	___
___		ii) other people in the community are trying it (note who)	___
___	___	iii) other ___	___
		G) Project related	
___	___	i) financial incentives	___
___	___	ii) technical advice	___
___	___	iii) availability of project equipment	___
___	___	iv) Other ___	___
		H) External Factors	
___	___	i) Conservation Meetings (non-SWEEP)	___
___	___	ii) Other ___	___
___	___	I) Other ___	

2. If cooperator has gained some experience with the practice:

A) How effective has the practice been and what's the evidence?

____

____

B) In what ways if any, was the practice or the management system adjusted to make everything work together well?

____

____

C) What could be done to make the practice work even better?

____

____

A-3. Test Co-operator Survey January 1991

SWEEP - PILOT WATERSHED STUDY
CO-OPERATOR SURVEY - WINTER 1990/91
(TEST BASINS)

The main purpose of this survey is to give each co-operator in the project test basins a chance to identify the main reason(s) they use, or do not use, various conservation practices. This will help the project team and others to better understand appropriate ways to promote conservation practices in and beyond the project watersheds.

Several questions also ask for your ideas on maximizing benefits from different project components (eg. newsletter, farm tours) during the remainder of the study. This will enable the project team to better meet the needs of all those associated with the project.

The answers that you provide will be grouped along with those of the other co-operators, so that individual responses will remain confidential.

Co-operator Name ______________________________

Date ____________________

Interviewer ______________________________

PILOT WATERSHED STUDY
CO-OPERATOR SURVEY (TEST BASIN) WINTER 1990-91

Part A - Conservation Practices

1. Please identify the main reasons why you *are working with* various conservation practices at this point in time (Table 1). (Note: Your technician will supply additional information to complete this question.)

2. Please identify the main reasons why you have decided *not to try* various conservation practices to date (Table 2). (Note: Your technician will supply additional information to complete this question.)

3. Please indicate your overall impression (e.g. how positive or negative) of the *practices* or *structures* you have *implemented* to date (from Table 1) by circling the appropriate number in the columns on the right hand side of the page:

	Positive				Negative	Don't Know	Not Applicable
Practice/Structure (please specify from Table 1) ________________							
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify) ____________	5	4	3	2	1	0	9
Practice/Structure (please specify from Table 1) ________________							
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify) ____________	5	4	3	2	1	0	9

	Positive				Negative	Don't Know	Not Applicable
Practice/Structure (please specify from Table 1) ________________							
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify) ____________	5	4	3	2	1	0	9
Practice/Structure (please specify from Table 1) ________________							
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify) ____________	5	4	3	2	1	0	9
Practice/Structure (please specify from Table 1) ________________							
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify) ____________	5	4	3	2	1	0	9

4. Please rate the importance to you of the following sources of information about conservation tillage and cropping practices by circling the appropriate number:

	Very Important				Not at all Important	Don't Know	No Contact
a) Local farm supply dealers	5	4	3	2	1	0	9
b) OMAF extension services	5	4	3	2	1	0	9
c) Self	5	4	3	2	1	0	9
d) Neighbours (within project boundaries)	5	4	3	2	1	0	9
e) Neighbours (outside project boundaries)	5	4	3	2	1	0	9
f) Technical support available through the project	5	4	3	2	1	0	9
g) Private crop consultants	5	4	3	2	1	0	9
h) Farm media	5	4	3	2	1	0	9
i) Other (specify) ________________	5	4	3	2	1	0	9

Part B - Project Components

This section asks for your comments/suggestions for maximizing the benefits from various project components during the remainder of the project.

5. **Newsletter**

A. Do you read the "ConservAction" Newsletter"?
[ ] Always [ ] Sometimes [ ] Never

B. What topics would you like covered in future issues, or what improvements could be made?

____

____

6. **Farm tours**

A. Have you participated in any of the project sponsored tours to-date?
[ ] yes [ ] No

B. What types of tours and possible locations would you suggest for future tours?

7. **Data/Monitoring Results**

A. Please indicate whether you have high, moderate, low or no interest in the monitoring information provided to you (please circle your response):

Type of Results	High	Moderate	Low	No Interest
i) Soil Tests	4	3	2	1
ii) Water Quality	4	3	2	1
iii) Economics (eg. crop yields, costs	4	3	2	1
iv) Residue Cover	4	3	2	1
v) Meteorological (precipitation, temperature)	4	3	2	1
vi) Other (specify) __________	4	3	2	1

B. Please indicate your level of interest in attending possible seminar presentations on the following topics:

Possible Topics	High	Moderate	Low	No Interest
i) Economic findings of the project	4	3	2	1
ii) Other monitoring results (specify) ________________	4	3	2	1
iii) Modifications to tillage equipment	4	3	2	1
iv) Herbicide use	4	3	2	1
v) Other (specify) ____________	4	3	2	1

8. **Technical Support**

A. How would you rate the technical support you've received to-date through the project (circle your response)?

Very Good	Good	Fair	Poor
4	3	2	1

B. What suggestions do you have for improving technical support? ____________

____

9. Other components which could be improved (specify) ________________

____

10. If you could have one or two project-related wishes granted by the SWEEP pilot watershed management team during the remainder of the project, what would you request? ____

____

11. Any other comments? ____

____

TABLE 1
REASONS FOR WORKING WITH VARIOUS CONSERVATION PRACTICES TO DATE

	MAIN FACTORS INFLUENCING DECISIONS (Of all possible factors and sub-factors given, please circle what you (the co-operator) consider to be the main factor and sub-factor for each practice used)								
CONSERVATION PRACTICE	Biophysical	Economics	Farm Manage	Technology	Personal	Community	Project	External	Comments
A. Cropping Systems 1. winter cover crop grown for crop									
2. winter cover tilled in spring									
3. cereal underseeded to red clover/alfalfa									
4. other _________									
B. Tillage and Planting Practices 1. modified/adjusted moldboard plough									
2. disc/coulter chisel plough									
3. disc or cultivate									
4. no-till									
5. no fall tillage									
6. other _________									
C. Land Management 1. buffer strip									
2. grassed waterway									
3. berms									
4. other structures _________									

TABLE 2
REASONS FOR NOT TRYING VARIOUS CONSERVATION PRACTICES TO DATE

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (Of all possible factors and sub-factors given, please circle what you (the co-operator) consider to be the main factor and sub-factor for each practice used)								
	Biophysical	Economics	Farm Manage	Technology	Personal	Community	Project	External	Comments
A. Cropping Systems									
1. winter cover crop grown for crop									
2. winter cover tilled in spring									
3. cereal underseeded to red clover/alfalfa									
4. other ________									
B. Tillage and Planting Practices									
1. modified/adjusted moldboard plough									
2. disc/coulter chisel plough									
3. disc or cultivate									
4. no-till									
5. no fall tillage									
6. other ________									
C. Land Management									
1. buffer strip									
2. grassed waterway									
3. berms									
4. other structures ________									

A-4. Equipment Use Survey Form July 1991

CUT-OFF MOLDBOARD PLOUGH/CONSERVATION TILLAGE SYSTEM

QUESTIONNAIRE
SWEEP PILOT WATERSHED PROJECT

We are interested in hearing your thoughts on how well the cut-off moldboard plough performed under conservation tillage conditions for you over the past season. We would greatly appreciate it if you could fill out this questionnaire as soon as possible while this experience is still fresh in your mind. Thank you for your help.

Where indicated below, please circle the appropriate response using the following key:

1 = poor
2 = not very satisfactory
3 = satisfactory
4 = very good
n/a = not applicable

1. How many years have you used a cut-off moldboard plough? _____years

2. a) How would you rate the cut-off moldboard plough in the following conditions?

corn residue	1	2	3	4	n/a
soybean residue	1	2	3	4	n/a
wheat residue	1	2	3	4	n/a
____________other residue	1	2	3	4	n/a

b) What problems did you encounter?____

____

c) Is there anything you would do differently next year?______________________

____

3. How would you rate your crops on cut-off moldboard ploughed ground?

crop_____	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

crop_____	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

3. (continued)

How would you rate your crops on cut-off moldboard ploughed ground?

crop____	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

4. Do you have suggestions for any conservation tillage equipment modifications (moldboard design, width of bottoms, depth of tillage)?____________________
____

5. How comfortable would you be continuing to use conservation tillage equipment on your own? (circle one)

1. Not at all 2. Slightly 3. Somewhat 4. Very

6. How can your future cut-off moldboard needs for a conservation tillage system best be met (circle one)?
   1. Rent from dealer
   2. Purchase own
   3. Modify own equipment
   4. Start no-till machinery user group
   5. Other. Explain ____________________________

7. What is it that you like most about the cut-off moldboard plough system as a whole?
____

8. What is it that you dislike most about the cut-off moldboard plough system as a whole?
____

9. How comfortable would you be continuing to use a cut-off moldboard plough system on your own? (circle one)

1. Not at all 2. Slightly 3. Somewhat 4. Very

07/91
540-55soc
I.D.___

CHISEL PLOUGH/CONSERVATION TILLAGE SYSTEM

QUESTIONNAIRE
SWEEP PILOT WATERSHED PROJECT

We are interested in hearing your thoughts on how well the chisel plough performed for you under conservation tillage conditions over the past season. We would greatly appreciate it if you could fill out this questionnaire as soon as possible while this experience is still fresh in your mind. Thank you for your help.

Where indicated below, please circle the appropriate response using the following key:

1 = poor
2 = not very satisfactory
3 = satisfactory
4 = very good
n/a = not applicable

1. How many years have you used a chisel plough?_____years

2. a) How would you rate the chisel plough performance with the following attachments?

i) twisted shovels on:	corn residue	1	2	3	4	n/a
	soybean residue	1	2	3	4	n/a
	wheat residue	1	2	3	4	n/a
___________	other residue	1	2	3	4	n/a
ii) sweeps on:	corn residue	1	2	3	4	n/a
	soybean residue	1	2	3	4	n/a
	wheat residue	1	2	3	4	n/a
___________	other residue	1	2	3	4	n/a

b) What problems did you encounter?________________________________

____

c) Is there anything you would do differently next year?________________

____

3. How would you rate your crops on chisel ploughed ground?

crop:_______	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

3. (continued)

How would you rate your crops on chisel ploughed ground?

crop:________	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

crop:________	emergence	1	2	3	4	n/a
	July 1 general appearance	1	2	3	4	n/a
	weed control	1	2	3	4	n/a

Explain____

4. Do you have suggestions for any conservation tillage equipment modifications (sweeps, twisted shovels, combination of sweeps/twisted shovels)?________________
____

5. How comfortable would you be continuing to use conservation tillage equipment on your own? (circle one)

1. Not at all 2. Slightly 3. Somewhat 4. Very

6. How can your future chisel plough needs for a conservation tillage system best be met (circle one)?
1. Rent from dealer
2. Purchase own
3. Modify own equipment
4. Start no-till machinery user group
5. Other. Explain ________________________________

7. What is it that you like most about the chisel plough system as a whole?__________
____

8. What is it that you dislike most about the chisel plough system as a whole? ________
____

9. How comfortable would you be continuing to use the chisel plough system on your own? (circle one)

1. Not at all 2. Slightly 3. Somewhat 4. Very

CONSERVATION ROW CROP PLANTER/NO-TILL SYSTEM

QUESTIONNAIRE
SWEEP PILOT WATERSHED PROJECT

We are interested in hearing your thoughts on how well the conservation row crop planter performed under no-till crop managment conditions for you over the past season. We would greatly appreciate it if you could fill out this questionnaire as soon as possible while this experience is still fresh in your mind. Thank you for your help.

Where indicated below, please circle the appropriate response using the following key:

1 = poor
2 = not very satisfactory
3 = satisfactory
4 = very good
n/a = not applicable

1. How many years have you used a conservation row crop planter to plant a no-till crop?
_____years

2 a) How would you rate the Conservation Row Crop Planter performance in the following no-till conditions?

i)	planting corn into:	corn residue	1	2	3	4	n/a
		soybean residue	1	2	3	4	n/a
		wheat residue	1	2	3	4	n/a
	____________________	other residue	1	2	3	4	n/a
ii)	planting soybeans into:	corn residue	1	2	3	4	n/a
		soybean residue	1	2	3	4	n/a
		wheat residue	1	2	3	4	n/a
	____________________	other residue	1	2	3	4	n/a

b) What problems did you encounter?____
____
____

c) Is there anything you would do differently next year?___________________________
____
____

3. a) How would you rate your no-till corn crop?

emergence	1	2	3	4	n/a
July 1 general appearance	1	2	3	4	n/a
weed control	1	2	3	4	n/a

Explain____

b) How would you rate your no-till bean crop?

emergence	1	2	3	4	n/a
July 1 general appearance	1	2	3	4	n/a
weed control	1	2	3	4	n/a

Explain____

4. Do you have suggestions for any no-till equipment modifications(planter, N applicator, sprayer, etc)?

____

____

5. How comfortable would you be continuing to use no-till equipment on your own? (circle one)

1. Not at all 2. Slightly 3. Somewhat 4. Very

6. How can your future row crop planter needs for the no-till system best be met (circle one)?
1. Rent from dealer
2. Purchase own
3. Modify own equipment
4. Start no-till machinery user group
5. Other. Explain ________________________________

7. What is it that you like most about the no-till row crop system as a whole?________

____

____

8. What is it that you dislike most about the no-till row crop system as a whole? _____

____

9. How comfortable would you be continuing to implement a no-till row crop system on your own? (circle one)
1. Not at all 2. Slightly 3. Somewhat 4. Very

07/91
540-55soc
I.D.___

NO-TILL DRILL

QUESTIONNAIRE
SWEEP PILOT WATERSHED PROJECT

We are interested in hearing your thoughts on how well the no-till drill performed for you over the past season. We would greatly appreciate it if you could fill out this questionnaire as soon as possible while this experience is still fresh in your mind. Thank you for your help.

Where indicated below, please circle the appropriate response using the following key:

1 = poor
2 = not very satisfactory
3 = satisfactory
4 = very good
n/a = not applicable

1. How many years have you used a No-till drill to plant a no-till crop?_____years

2 a) How would you rate the No-till drill performance in the following no-till conditions?

i) drilling soybeans into:	corn residue	1	2	3	4	n/a
	soybean residue	1	2	3	4	n/a
	wheat residue	1	2	3	4	n/a
	__________other residue	1	2	3	4	n/a
ii) drilling wheat into	corn residue	1	2	3	4	n/a
	soybean residue	1	2	3	4	n/a
	wheat residue	1	2	3	4	n/a
	__________other residue	1	2	3	4	n/a
iii) drilling _____into:	corn residue	1	2	3	4	n/a
	soybean residue	1	2	3	4	n/a
	wheat residue	1	2	3	4	n/a
	__________other residue	1	2	3	4	n/a

b) What problems did you encounter____
____

c) Is there anything you would do differently next year?_____________________
____

3. a) How would you rate your no-till soybean crop?

emergence	1	2	3	4	n/a
July 1 general appearance	1	2	3	4	n/a
weed control	1	2	3	4	n/a

Explain____

b) How would you rate your no-till wheat crop?

emergence	1	2	3	4	n/a
July 1 general appearance	1	2	3	4	n/a
weed control	1	2	3	4	n/a

Explain____

c) How would you rate (other) ________ no-till crops?

emergence	1	2	3	4	n/a
July 1 general appearance	1	2	3	4	n/a
weed control	1	2	3	4	n/a

explain____

4. Do you have suggestions for any no-till equipment modifications (planter, N applicator, sprayer, etc.)?

____

5. How comfortable would you be continuing to use no-till equipment on your own? (circle one)
1. Not at all 2. Slightly 3. Somewhat 4. Very

6. How can your future drill needs for the no-till system best be met (circle one)?
1. Rent from dealer
2. Purchase own
3. Modify own equipment
4. Start no-till machinery user group
5. Other. Explain ________________________________

7. What is it that you like most about using the drill in a no-till system as a whole?____

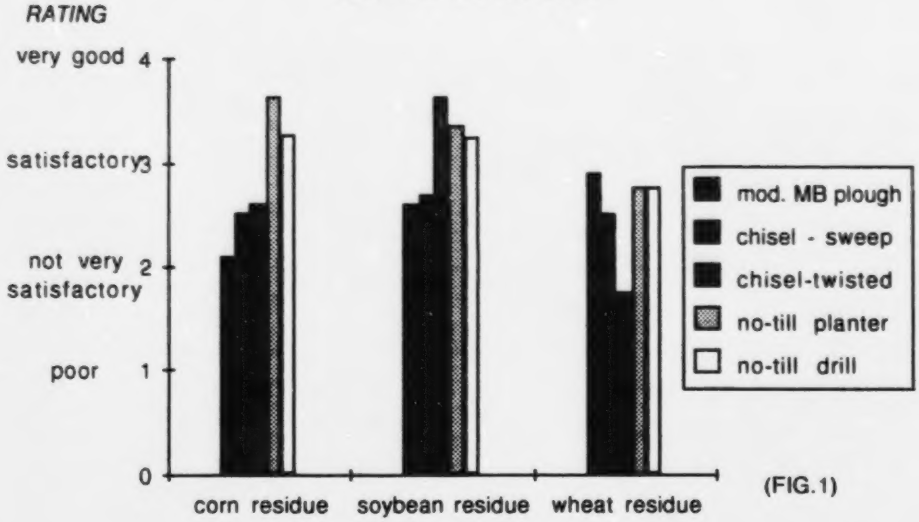
____

8. What is it that you dislike most about using the drill in a no-till system as a whole? _

____

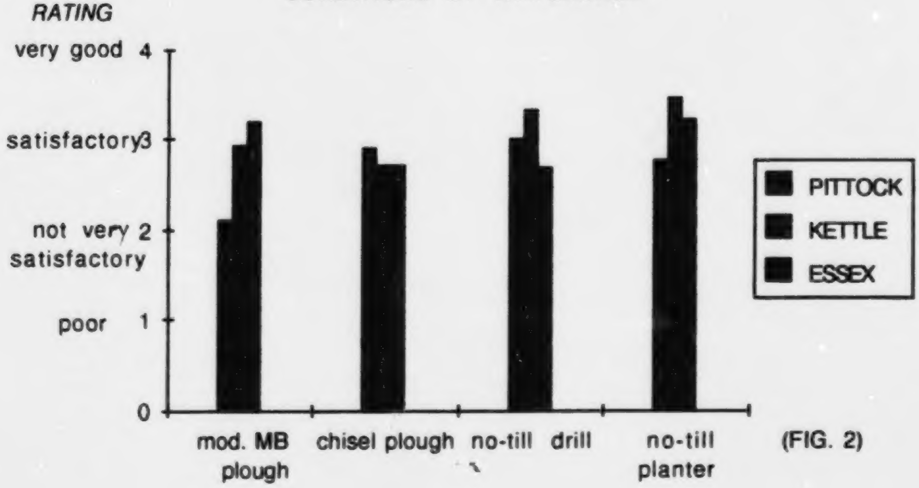
9. How comfortable would you be continuing to implement a no-till row crop system on your own? (circle one)
1. Not at all 2. Slightly 3. Somewhat 4. Very

PERFORMANCE RATINGS OF EQUIPMENT USED ON VARIOUS RESIDUE CONDITIONS



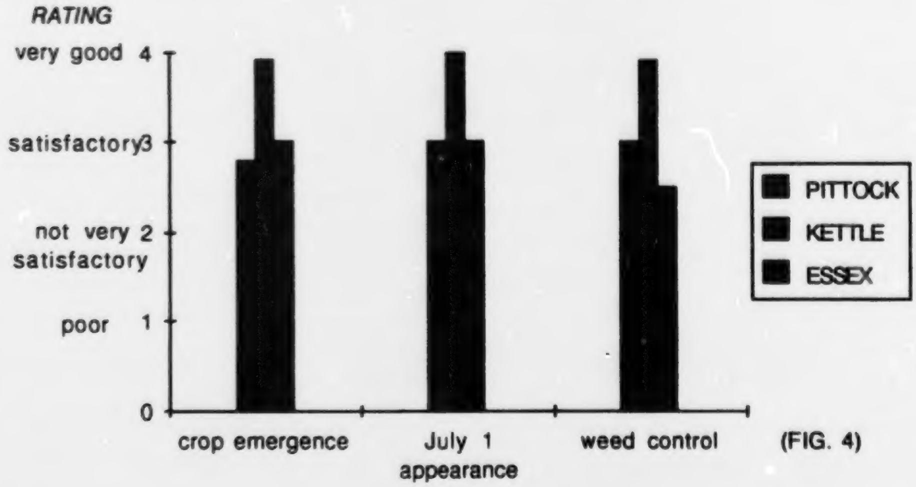
(FIG.1)

SUMMARY OF EQUIPMENT PERFORMANCE RATINGS IN ALL RESIDUE CONDITIONS BY WATERSHED



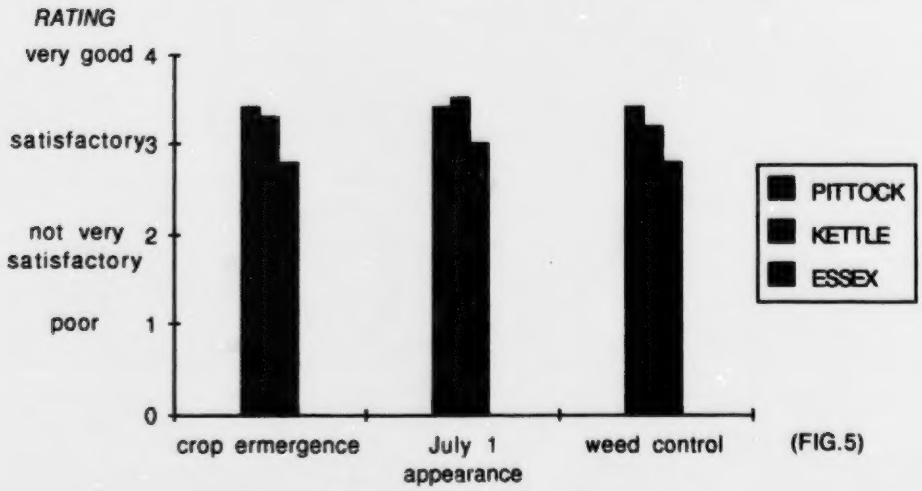
(FIG. 2)

SATISFACTION RATINGS WITH USE OF MODIFIED PLOUGH



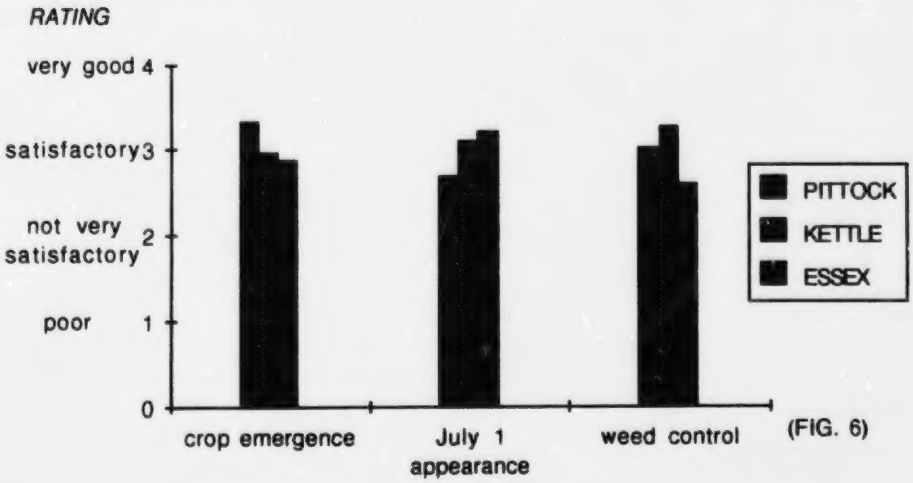
(FIG. 4)

SATISFACTION RATINGS WITH USE OF CHISEL PLOUGH



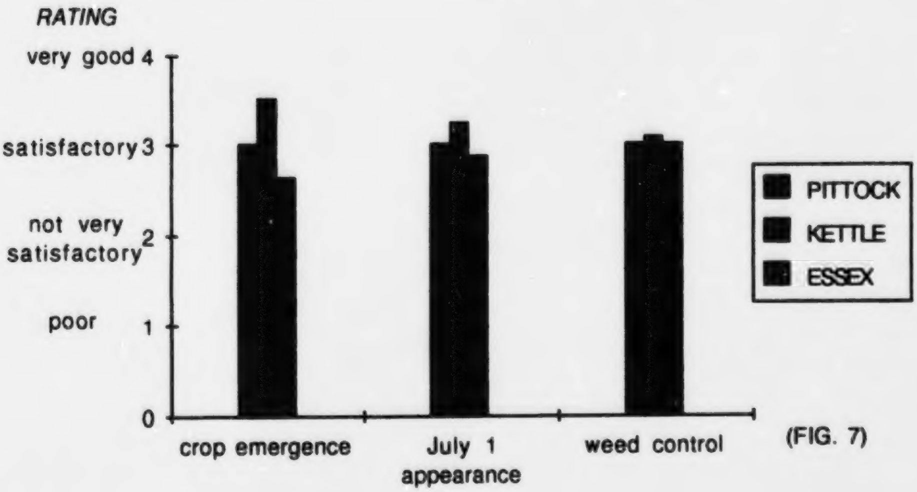
(FIG.5)

SATISFACTION RATINGS WITH USE OF NO-TILL DRILL



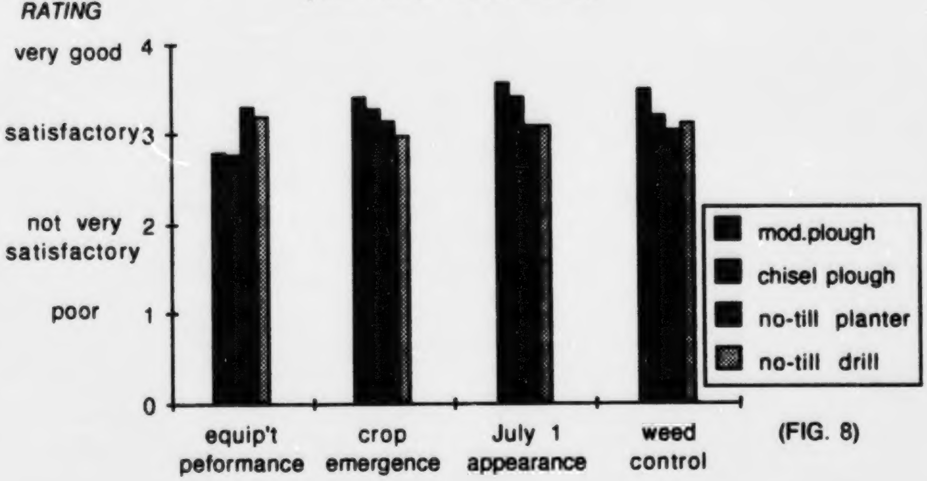
(FIG. 6)

SATISFACTION RATINGS WITH USE NO-TILL PLANTER



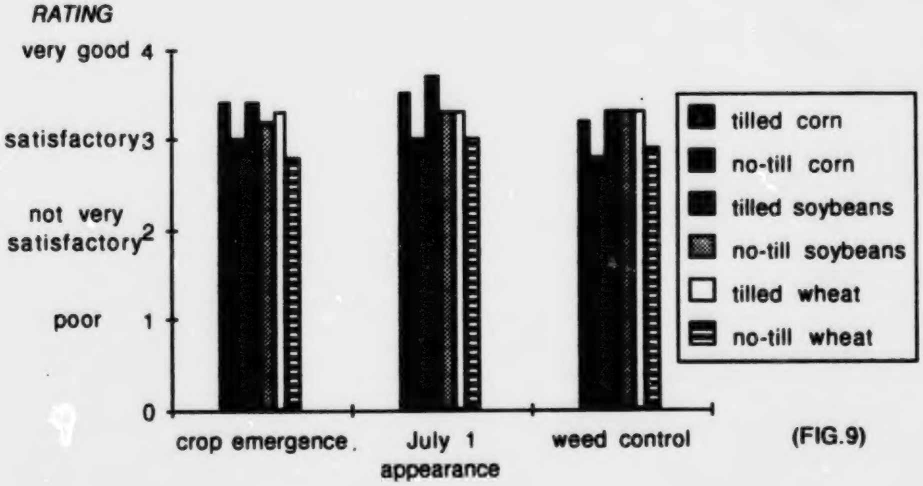
(FIG. 7)

OVERALL SATISFACTION RATINGS OF EQUIPMENT USED
(all three watersheds)



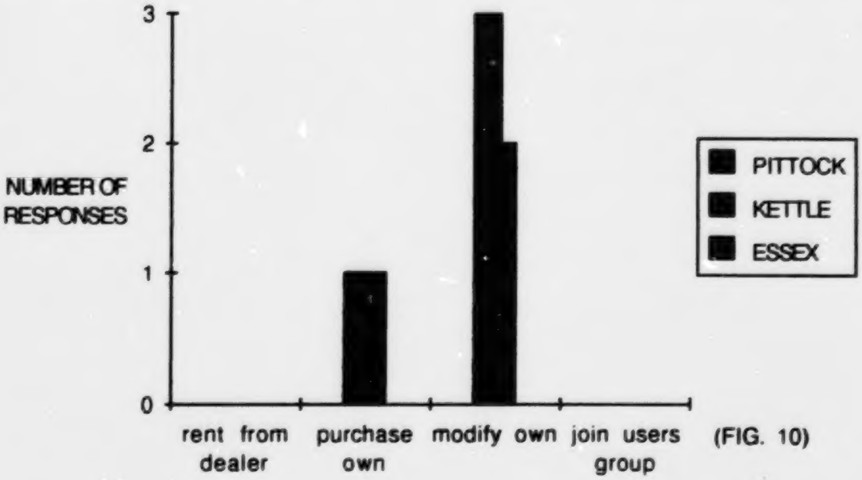
(FIG. 8)

SATISFACTION RATINGS OF NO-TILL VERSUS TILLED CROPS



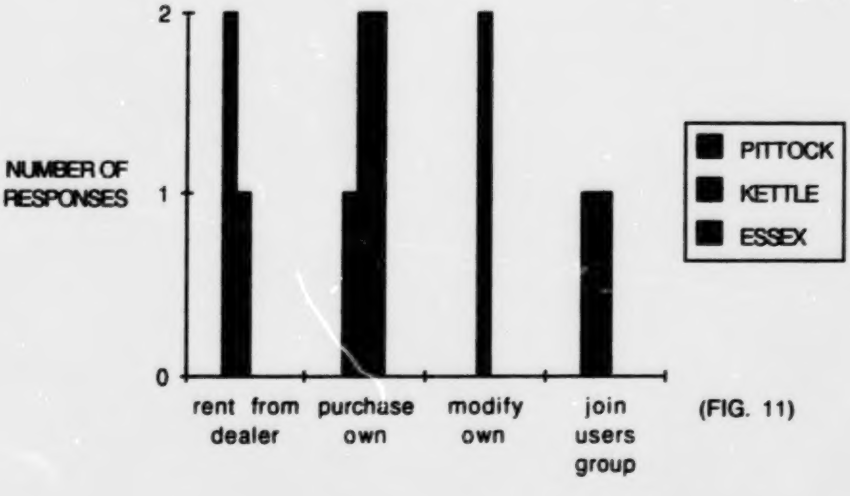
(FIG.9)

MEANS FOR MEETING FUTURE MODIFIED MB PLOUGH NEEDS



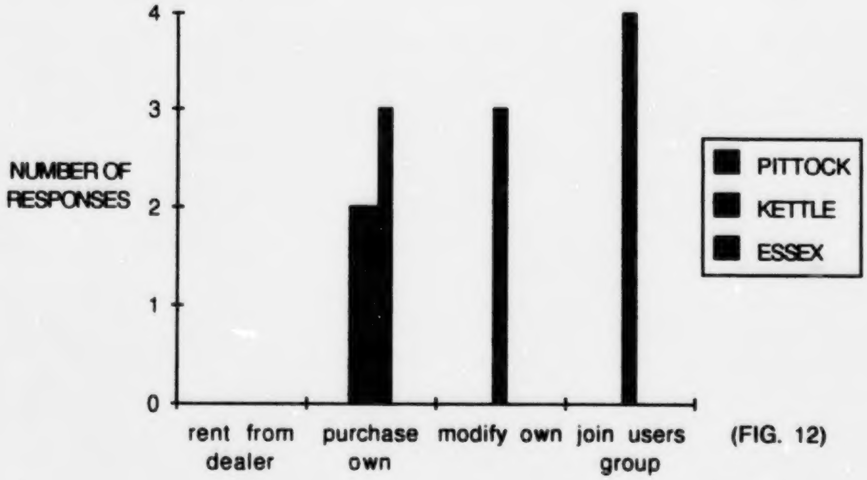
(FIG. 10)

MEANS FOR MEETING FUTURE CHISEL PLOUGH NEEDS



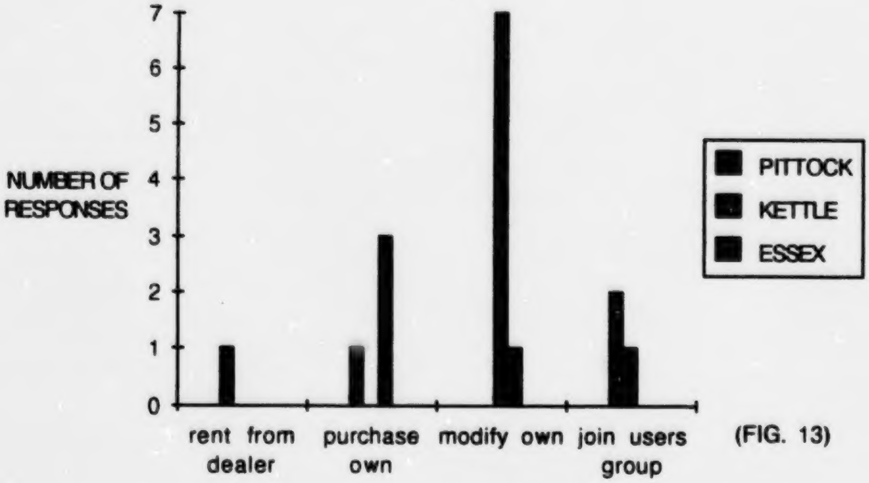
(FIG. 11)

MEANS FOR MEETING FUTURE NO-TILL DRILL NEEDS



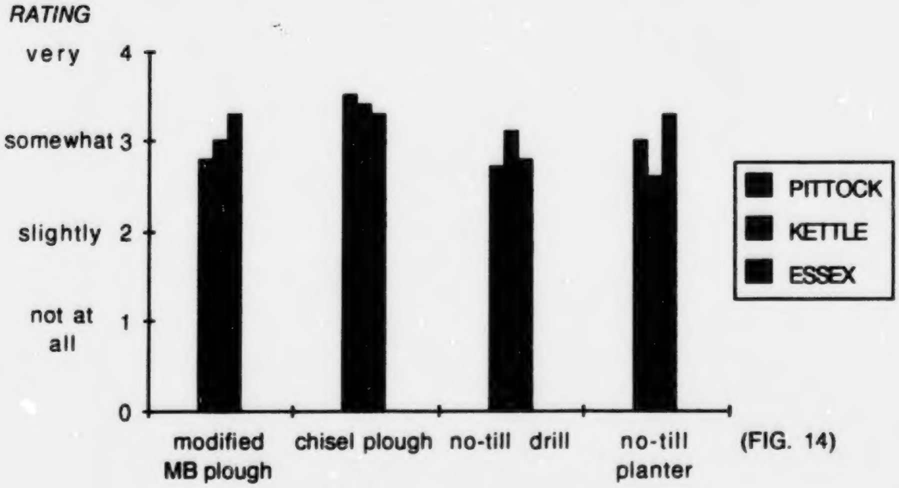
(FIG. 12)

MEANS FOR MEETING FUTURE NO-TILL PLANTER NEEDS



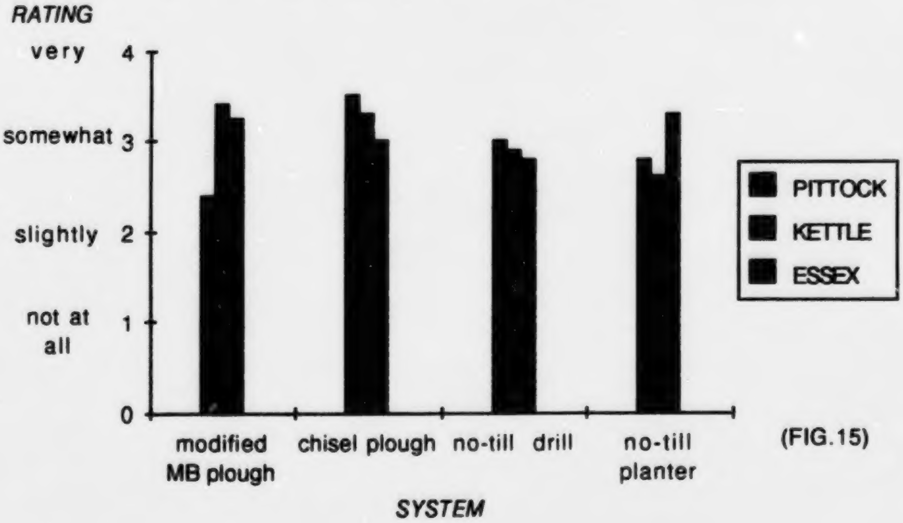
(FIG. 13)

COMFORT LEVEL WITH USE OF CONSERVATION EQUIPMENT



(FIG. 14)

COMFORT LEVEL WITH CONSERVATION SYSTEM



(FIG.15)

A-5. Final Co-operator Survey Form January 1992

SWEEP - PILOT WATERSHED PROJECT

Cooperator Survey - Winter 1991/92

Welcome to the last large survey in the life of SWEEP! Yes, the Project is being "extended" until September 30, 1992, but in a somewhat different form. So, we felt that now is probably the best time in the life of the Project to collect your opinions on project related topics.

Your participation in our previous surveys has been most helpful - we really appreciate your patience and honesty in filling them out. We hope these questions and the final results will be of some interest to you.

This survey is organized in four different sections including: I. General, II. Specific Practices, III. Other Project Components, IV. Future - Beyond the Watershed Project. All control and test watershed cooperators will complete the survey although only the test cooperators need to complete the section "Specific Practices".

After the watershed technician drops off the survey, you are welcome to begin filling it out at your convenience. Shortly thereafter, the technician will arrange a suitable interview time with you to go over the form. For those in the test watershed, the technician will also bring along the few pages for Section II, and the necessary explanation for completing it.

The answers that you provide in this survey will be grouped along with those of the other cooperators so that individual responses will remain confidential. Your answers will enable the project team and others, to better understand appropriate ways to promote conservation practices beyond the project watersheds. Thanks!

Co-operator Name ....

Date ....

Interviewer ....

Test or Control (or both) ....

0540\E3\E3SURVEY.SUB

COOPERATOR SURVEY - WINTER 1991/92

I. GENERAL

This section asks for your opinions about the land you farm within the project area and about some broader environmental issues.

1. **Please identify the extent to which the situations listed occur on land you farm within the project watershed. Circle one number for each situation.** ***NOTE: If you farm land in both the test and control watersheds, please make note of any differences that you observe.***

Type of Situation	Extent to Which Situation Exists			
	Extensive	Regular Occurrence	Some Occurrence	Not At All
A. Decrease in yields on knolls or water runs in fields.	4	3	2	1
B. Soil washing away from around tile outlets or along ditch/streambanks	4	3	2	1
C. Evidence of soil compaction in some fields	4	3	2	1
D. Injury to young plants due to wind erosion or being covered by sediment	4	3	2	1
E. Eroded soil filling in drainage ditches	4	3	2	1
F. Seasonal evidence of soil washing (rills or small gullies) on some fields	4	3	2	1
G. Other (specify)	4	3	2	1

	Serious Occurrence	Moderate Occurrence	Slight Occurrence	Not At All
2. **Overall, to what extent do you feel soil erosion is occurring today on land you farm within the project watershed? (Circle one)** ***NOTE: If you farm land in both the test and control watersheds, please make note of any differences that you observe.***	4	3	2	1

	A Great Deal	Somewhat	Slightly	Not At All
3. **To what extent does information about soil and water quality affect the decisions you make in your farming operation today? (Circle one)**	4	3	2	1

4. **Listed below are some statements about the local area and the environment. Please indicate if you agree or disagree with them by circling the appropriate number.**

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Don't Know
A. Water quality in this basin's drain has been improving over the past 4 years .	Test 1	2	3	4	5	0
(Note: if you farm land in both the control and test watersheds, please answer the question for both.)	Control 1	2	3	4	5	0
B. Making an effort to conserve soil and reduce runoff in this area is a good investment.	1	2	3	4	5	0
C. In general, costs to the farmer of soil conservation are greater than the on-farm benefits.	1	2	3	4	5	0
D. Society as a whole should pay more of the costs for agricultural pollution control.	1	2	3	4	5	0

5. a) **In general, how frequently would you say you have contact with any of your neighbours who farm land in the project watershed (either test or control). (Circle one)**

[1] daily

[2] weekly

[3] monthly

[4] four times/year

[5] once/year

[6] never

b) **Would you say this level of contact has (circle one):**

[1] increased

[2] remained about the same

[3] decreased

as a result of the Watershed project?

6. a) Within the past year, have you attended any meetings dealing specifically with soil conservation topics? Possible sponsors include OMAF, Soils and Crops Improvement Association (LSP, NSCP) or other local groups. (Do not include any SWEEP meetings regarding the Watershed Program).

[1] Yes [2] No

b) Compared with the combined influence of the programs noted in 6 a), how strong an influence has the Watershed project been for you in deciding to implement soil and water conservation practices?

Strong Influence	Moderate Influence	Little Influence	No Influence At All	Don't Know
1	2	3	4	0

7. a) In general, to what extent do you feel farmers in this community are supportive of soil and water conservation efforts? (Circle one)

Not at all Supportive	Slightly Supportive	Somewhat Supportive	Very Supportive
1	2	3	4

b) Would you describe this community's recent experience with conservation practices as: (Choose one)

Very Positive	Somewhat Positive	Somewhat Negative	Very Negative	Community has little or no experience
1	2	3	4	5

8. Please indicate the extent to which you agree or disagree with the following statements. (Circle one number for each statement.)

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
A. I consider my neighbours' opinions when I make decisions regarding conservation practices.	1	2	3	4	5
B. I am reluctant to accept conservation practices until I see them working for people around me.	1	2	3	4	5
C. Of my neighbours, I would be among the first few to try a conservation practice.	1	2	3	4	5
D. I feel a moral obligation to prevent soil loss due to erosion.	1	2	3	4	5

II. CONSERVATION PRACTICES - (TEST COOPERATORS ONLY)

9. **Please identify the main reasons why you are continuing to work with various conservation practices at this point in time (Table 1 - attached). (Note: Your technician will supply additional information to complete this question.)**

10. **Please identify the main reasons why you have decided not to try, or have discontinued use of, various conservation practices this past year (Table 2 - attached). (Note: Your technician will supply additional information to complete this question.)**

11. **Please indicate your overall impression (e.g. how positive or negative) of the practices or structures you have implemented to date (from Table 1 - attached) by circling the appropriate number in the columns on the right hand side of the page:**

Practice/Structure (please specify from Table 1)	Positive				Negative	Don't Know	Not Applicable
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify)	5	4	3	2	1	0	9
Practice/Structure (please specify from Table 1)	Positive				Negative	Don't Know	Not Applicable
i) change in crop yield	5	4	3	2	1	0	9
ii) change in soil erosion control	5	4	3	2	1	0	9
iii) fits into farm management system	5	4	3	2	1	0	9
iv) acceptance in the community	5	4	3	2	1	0	9
v) effects on profitability of your farm operation	5	4	3	2	1	0	9
vi) Other (specify)	5	4	3	2	1	0	9

TABLE 1
REASONS FOR WORKING WITH VARIOUS CONSERVATION PRACTICES TO DATE

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (Of all possible factors and sub-factors given, please circle what you (the co-operator) consider to be the main factor and sub-factor for each practice used)								COMMENTS
	Biophysical	Economics	Farm Management	Technology	Personal	Community	Project	External	
A. Cropping Systems 1. winter cover crop grown for crop									
2. winter cover tilled in spring									
3. cereal underseeded to red clover/alfalfa									
4. other									
B. Tillage and Planting Practices 5. modified/adjusted moldboard plough									
6. disc/coulter chisel plough									
7. disc or cultivate									
8. no-till									
9. no fall tillage									
10. other									
C. Land Management 11. buffer strip									
12. grassed waterway									
13. berms									
14. tile outlet protection									
15. other structures									

TABLE 2
REASONS FOR NOT TRYING OR DISCONTINUING USE OF VARIOUS CONSERVATION PRACTICES THIS YEAR

CONSERVATION PRACTICE	MAIN FACTORS INFLUENCING DECISIONS (Of all possible factors and sub-factors given, please circle what you (the co-operator) consider to be the main factor and sub-factor for each practice used)								COMMENTS
	Biophysical	Economics	Farm Management	Technology	Personal	Community	Project	External	
A. Cropping Systems 1. winter cover crop grown for crop									
2. winter cover tilled in spring									
3. cereal underseeded to red clover/alfalfa									
4. other									
B. Tillage and Planting Practices 5. modified/adjusted moldboard plough									
6. disc/coulter chisel plough									
7. disc or cultivate									
8. no-till									
9. no fall tillage									
10. other									
C. Land Management 11. buffer strip									
12. grassed waterway									
13. berms									
14. tile outlet protection									
15. other structures									

III. OTHER PROJECT COMPONENTS

12. a) In thinking back to the first start up meetings, how helpful do you remember them being in terms of (Circle your response):	Very Helpful	Somewhat Helpful	Slightly Helpful	Not at all Helpful	Don't Know
i) understanding purpose of the Project	1	2	3	4	0
ii) providing useful technical information	1	2	3	4	0
iii) motivating to action	1	2	3	4	0
iv) providing a sense of group or community support	1	2	3	4	0

12. b) What do you think could have been done to make these meetings more helpful?

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13. a) Annual Individual Farm Planning Sessions - How would you rate the helpfulness of the following:	Very Helpful	Somewhat Helpful	Slightly Helpful	Not at all Helpful	Don't Know
i) the range of conservation practice options that were made available to you	1	2	3	4	0
ii) the information/technical assistance given to you in support of these options	1	2	3	4	0

13. b) Overall, do you feel that you were able to "stick to" the conservation practices that were specified in your farm plans?	Always	Sometimes	Seldom	Never
	1	2	3	4

13. c) What were the main problems in carrying out the farm plans?

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BENEFIT PACKAGE

14. a) Soil fertility tests results were provided to you on a regular basis. Did you follow the recommendations:

Frequently	Sometimes	Seldom	Never
1	2	3	4

14. b) If you "seldom" or "never" followed the recommendations, please explain why.

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14. c) How frequently have you asked your technician for daily weather records (rainfall, temperatures, etc.)?

Frequently	Sometimes	Seldom	Never
1	2	3	4

15. a) Crop scouting services were provided to all cooperators. Did you find that you used the results to make decisions about spraying or other crop management practices?

Frequently	Sometimes	Seldom	Never
1	2	3	4

15. b) FOR TEST COOPERATORS. Did scouting help make any changes in conservation practice seen less risky because you knew what weed problems were there, for example?

Frequently	Sometimes	Seldom	Never
1	2	3	4

15. c) If the results were seldom or never used, what were the reasons?

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16. a) How useful has the information from the soil survey (soil texture, organic matter, drainage, erosion phases, etc.) of the watershed been to you?

Very Useful	Somewhat Useful	Seldom Useful	Never Useful
1	2	3	4

b) How have you used this information, if at all?

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17. Overall, how would you rate the technical support you've received through the Program?

Very Good	Good	Fair	Poor	Not Used
1	2	3	4	5

18. a) **A variety of conservation equipment has been made available to you throughout the Project. Please circle your response to the following statements:**

Statement	Always	Most Times	Only Sometimes	Never	Didn't Use Equipment
i) the equipment was available when I needed it	1	2	3	4	5
ii) it was in good repair when I used it	1	2	3	4	5
iii) the technical assistance (i.e. for setup) was available	1	2	3	4	5

b) **How could any problems with equipment use have been better overcome?**

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19. a) **Financial Assistance - Please comment on how adequate you feel the compensation has been for any of the following actions you have taken, by circling "1", "2" or "3".** ***NOTE: Cooperators in the control areas need only consider the "field records" part of this table.***

Action	Rate ($)	More than Adequate	Adequate	Inadequate	Comments
Adjusted moldboard	5/ac	1	2	3	
Modified moldboard	10/ac	1	2	3	
Disk/counter-chisel	10/ac	1	2	3	
No fall tillage	10/ac	1	2	3	
Disc or cultivate	5/ac	1	2	3	
No till	15/ac	1	2	3	
Winter cover crop grown for crop	5/ac	1	2	3	
Winter cover crop tilled in spring	10/ac	1	2	3	
Cereal underseeded to red clover	5/ac	1	2	3	
Field Records	400/yr	1	2	3	
Field Records (pasture/hay)	100/yr	1	2	3	
Buffer strip	100/ac	1	2	3	
Critical areas seeded down to hay	100/ac	1	2	3	
Specified percent residue cover after planting (1990, 1991)	5/ac	1	2	3	

19. b) Have you ever declined to implement a practice because you felt the compensation was unreasonably low?

[1] Yes [2] No

If yes, for which practice(s)?

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20. Field Management Record books: given the level of detail that was necessary for Project purposes, do you now see ways that it could have been made any easier or more effective.

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INFORMATION PROGRAM

21. a) The newsletter "ConservAction" has been published regularly during the Watershed Project. Do you read the newsletter?

[1] Always [2] Sometimes [3] Never

21. b) To what extent have the various sections of the newsletter been of interest to you?

	Very Interesting	Somewhat Interesting	Of Little Interest	Of No Interest
i) upcoming events	1	2	3	4
ii) news from the watersheds	1	2	3	4
iii) environmental monitoring	1	2	3	4
iv) specific technical input (eg. nutrient management, equipment modifications)	1	2	3	4
v) special interest stories (eg. conservation in Haiti, conservation farm families)	1	2	3	4
vi) other (specify)	1	2	3	4

21. c) How could newsletter content have been improved?

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22. a) Have you participated in any of the project-sponsored farm or research station tours?

[1] Yes [2] No

22. b) If you have participated in at least one tour, to what extent have these been of help to you in your conservation practice decision-making?

Very Helpful	Somewhat Helpful	Slightly Helpful	Not At All Helpful
1	2	3	4

22. c) Should there have been:

[1] more [2] about the same number of [3] fewer

tours planned?

22. d) Please identify particular highlights of the tours you have joined.

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23. Annual meetings have been held in the watersheds every March or April to provide an update for the Project, to present monitoring results, and encourage communication between cooperators and with Project staff.

a) Did you attend one or more of these meetings?

[1] Yes [2] No

23. b) If you attended any of these meetings, to what extent do you feel these meeting objectives (noted in 23 above) were generally met?

Always	Sometimes	Seldom	Never
1	2	3	4

IV. FUTURE - BEYOND THE WATERSHED PROJECT

24. a) After the Watershed Project finishes, what is the likelihood that you'll continue on with conservation practices/structures implemented under SWEEP, somewhere in your farming operation? (Circle the appropriate number for each relevant practice. If you are in the control watershed, include your opinions for practices used on land outside the watershed boundary).

CONSERVATION PRACTICE	LIKELIHOOD				
	Increase Acreage	Same Acreage	Decrease Acreage	Won't Continue	Don't Know
A. Cropping Systems					
1. winter cover crop grown for crop	1	2	3	4	0
2. winter cover tilled in spring	1	2	3	4	0
3. cereal underseeded to red clover/alfalfa	1	2	3	4	0
4. other	1	2	3	4	0
B. Tillage and Planting Practices					
1. modified/adjusted moldboard plough	1	2	3	4	0
2. disc/coulter chisel plough	1	2	3	4	0
3. disc or cultivate	1	2	3	4	0
4. no-till	1	2	3	4	0
5. no fall tillage	1	2	3	4	0
6. other	1	2	3	4	0
C. Land Management	Increase Number	Same Number	Decrease Number	Don't Know	
1. buffer strip	1	2	3	0	
2. grassed waterway	1	2	3	0	
3. berms	1	2	3	0	
4. tile outlet protection	1	2	3	0	
5. other structures (specify)	1	2	3	0	

24. b) What kinds of support do you think will be required to assist you in continuing the practices noted above?

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25. **What practices which you haven't tried yet, are you likely to try within the next year or two?**

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26. **In the future, after the Watershed project finishes, how important do you think the following sources of information about conservation tillage and cropping practices will be to you? (Please circle the appropriate number)**

	Very Important				Not at all Important	Don't Know	No Contact
a) Local farm supply dealers	5	4	3	2	1	0	9
b) OMAF extension services	5	4	3	2	1	0	9
c) Self	5	4	3	2	1	0	9
d) Cooperators within project boundaries	5	4	3	2	1	0	9
e) Neighbours (outside project boundaries)	5	4	3	2	1	0	9
f) Soil and Crop Improvement Association (SCIA)	5	4	3	2	1	0	9
g) Private crop consultants	5	4	3	2	1	0	9
h) Farm media	5	4	3	2	1	0	9
i) Other (specify)	5	4	3	2	1	0	9

27. **At one point in the Project, you were asked to consider your own personal objectives for the Project. From the list below, please choose those that you would call "your own" and indicate the degree to which they have been met.**

Possible Objectives	Extent to Which My Objectives Were Met				
	Fully	Partially	Only Slightly	Not At All	Don't Know
• save time at work	1	2	3	4	0
• decrease soil erosion	1	2	3	4	0
• improve soil structure	1	2	3	4	0
• save fuel	1	2	3	4	0
• decrease equipment inventory	1	2	3	4	0
• increase profits	1	2	3	4	0
• set an example for my family	1	2	3	4	0
• decrease risk	1	2	3	4	0
• save soil for next generation	1	2	3	4	0
• learn a new tillage or cropping system	1	2	3	4	0
• keep 20% or more residue cover on the fields	1	2	3	4	0
• be patient and positive with new ideas	1	2	3	4	0
• get the Project over with as soon as possible	1	2	3	4	0
• to help meet Project objectives	1	2	3	4	0
• other (specify)	1	2	3	4	0

28. a) You as a cooperator have no doubt experienced numerous "ups and downs" during the course of the Watershed Project. However, how would you rate your overall experience in the Project?

Very Positive	Somewhat Positive	Neither Positive or Negative	Somewhat Negative	Very Negative
1	2	3	4	5

28. b) Please identify an incident/experience that you'll remember as being a particularly positive experience.

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28. c) Please identify an incident/experience that you'll remember as being a particularly negative experience.

....

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29. a) If a similar Watershed Project were ever to be considered for other parts of Ontario, what advice would you give program managers to ensure good understanding and working relationships with the cooperators?

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b) One suggestion that has surfaced to ensure healthy interaction between cooperators, and between cooperators and project staff, was to form a cooperator-run watershed committee that would try to resolve issues as they arose in the watershed. To what extent do you feel this would have helped to improve communications in your watershed?

Very Helpful	Somewhat Helpful	Slightly Helpful	Not At All Helpful
1	2	3	4

30. a) To what extent do you feel the interest of your neighbours (those outside project boundaries) has been raised in solving soil and water conservation problems, as a result of this Project?

A Great Deal	Somewhat	Slightly	Not At All	Don't Know
1	2	3	4	0

30. b) If you feel interest has been raised among neighbours, how do you know?

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31. (TEST COOPERATORS ONLY) Many of you have tried quite a few conservation practices during the past three cropping seasons. If you could have chosen the length of time for the Project to operate, how many years in total would you have recommended in order for you to develop more complete confidence in the practices you've tried? (Specify by practice if possible)

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32. a) (FOR CONTROL COOPERATORS ONLY) A lot of attention was focused on the test watersheds during this Project. Were there ever times that you felt in some way "disadvantaged" by the Project?

[1] Yes [2] No

b) If yes, please describe.

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33. If you wish, please add any other comments relevant to the Project or to this survey.

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THANKS!